PROCEEDINGS AND ADDRESSES

OF THE

SIXTH GENERAL CONFERENCE

OF THE

HEALTH OFFICIALS IN MICHIGAN,

ANN ARBOR, MICHIGAN,

JANUARY 15 AND 16, 1903.

UNDER THE AUSPICES OF THE STATE BOARD OF HEALTH.

[No. 589.]

BY AUTHORITY.

LANSING, MICHIGAN
ROBERT SMITH PRINTING CO., STATE PRINTERS AND BINDERS
1903

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MICHIGAN STATE BOARD OF HEALTH SEAL.

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SIXTH GENERAL CONFERENCE OF HEALTH OFFICIALS IN MICHIGAN.

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PROCEEDINGS,

ADDRESSES, AND DISCUSSIONS AT THE SIXTH GENERAL CONFERENCE OF HEALTH OFFICIALS IN MICHIGAN, AT ANN ARBOR, MICHIGAN, JANUARY 15 AND 16, 1903.

The Conference was held by direction and under the auspices of the Michigan State Board of Health, arrangements having been made by a committee of the Board.

INVITATION AND PROGRAM.

The invitation and program included the following:—

To each Mayor, Member of a Common Council, President and Trustee of a Village, Officer and Member of a Local Board of Health in Michigan:

DEAR SIR—The Sixth General Conference of the Health Officials in Michigan will be held in Ann Arbor, Thursday and Friday, January 15 and 16, 1903.

It is earnestly hoped that your Board will send your health officer or at least one delegate to this Conference.

OBJECTS OF THE CONFERENCE.

The objects of the Conference are: The presentation of facts and the general comparison of views by the Health Officers and other Delegates of Local Boards of Health, among themselves, with the members of the State Board of Health and with those in charge of the State Laboratory of Hygiene, and especially with reference to the duties of Health Officers and other matters bearing upon the public health service of the State.

This is not a Medical Conference, it is for all health officials and delegates, professional and non-professional. It is expected to have the most advanced scientific presentation of facts in important branches of sanitary science; and it is hoped that public health administration will be dealt with by health officers and others who have had experience or have given those subjects much thought. But the discussions are not restricted except by the shortness of time at the disposal of the Conference. Every delegate is expected to contribute his part for the general good.

FIRST SESSION.

Thursday, January 15, at 2:00 P. M. (Standard Time).

1. Address of Welcome, by James B. Angell, President of the University.
2. Introductory Address, by Hon. Frank Wells, President of the State Board of Health.
3. The Interest of the State in Public Health Work, by Hon. A. T. Bliss, Governor of Michigan, who will be present if possible.
4. The Relation of the State Laboratory of Hygiene to the Health Work of the State, by V. C. Vaughan, Professor of Hygiene, Director of the State Laboratory of Hygiene, and Dean of the Medical Faculty in the University, Ann Arbor.
5. Discussion of the Subject, to be closed by Dr. Vaughan.

SECOND SESSION.

Thursday, January 15, at 8:00 P. M. (Standard Time).

1. The Increasing Prevalence of Pneumonia, and the Necessity of Measures for its Restriction, by Arthur R. Reynolds, Commissioner of Health, Chicago.
2. Discussion of the Subject.
3. Mosquitoes and Malaria, with some Observations in Michigan, by George Dock, Professor of Medicine, etc., in the University, Ann Arbor.
4. Discussion of the Subject.
5. The Local Slaughter-House and Meat Inspection, by Rev. Caroline Bartlett Crane, Kalamazoo.
6. Discussion of the Subject.

THIRD SESSION.

Friday, January 16, at 9:00 A. M. (Standard Time).

1. Hydrophobia,—Rabies, its Restriction and Prevention, by F. G. Novy, Professor of Bacteriology in the University, Ann Arbor.
2. Discussion of the Subject.
3. Mortality from Cancer in Michigan, by Cressy L. Wilbur, Chief of Division of Vital Statistics, Department of State, Lansing.
4. Discussion of the Subject, led by A. S. Warthin, Junior Professor of Pathology in the University, Ann Arbor.
5. The Legal Duties of Health Officers, by Hon. Henry A. Haigh, Member State Board of Health, Detroit.
6. Discussion of the Subject.
7. Should Vaccination be Compulsory in Michigan? by Guy L. Kiefer, Health Officer of Detroit.
8. Discussion of the Subject.

FOURTH SESSION.

Friday, January 16, at 2:00 P. M. (Standard Time).

Tuberculosis, Human and Bovine, Sanatoria for Consumptives. General Discussion of the Subject of Tuberculosis and its Restriction, led by Hon. Frank Wells, President of the State Board of Health.

Sewerage into the Water Courses of Michigan. What Should be Done About it? General Discussion of the Subject, led by Victor C. Vaughan, Member of the State Board of Health, Professor of Hygiene, Director of the State Laboratory of Hygiene, and Dean of the Medical Faculty in the University, Ann Arbor.

The Plague in California: and What to Do if that Disease Should be Brought into Michigan. General Discussion of the Subject, led by F. G. Novy, Professor of Bacteriology in the University, Ann Arbor.

This Conference of Health Officials is held for the benefit of every locality in Michigan. It is hoped that many localities may have delegates there, thus securing the most direct benefits. Every State and local officer there will probably learn much that will enable him to do better service in guarding the public health. It is believed that any city or village can legally and properly send a delegate, and this Board has no doubt on this point or it would not have called the Conference. It is hoped also that many townships not too distant and even distant ones, if specially exposed to the introduction and spread of disease, may each send a delegate.

The papers and discussions will be of sufficient practical importance to the delegates, in their future work for their several localities, to well repay the expense incurred by their localities in sending them to this Conference.

It is expected that different kinds of appliances for disinfection by formaldehyde will be exhibited.

Your Board of Health is urgently solicited to send a delegate to this Conference. The Conference will convene Thursday, January 15, at 2:00 P. M., standard time, and continue its work through the afternoon of Friday, January 16.

OFFICERS AND PERSONS IN ATTENDANCE.

F. D. LeValley, M. D., Health Officer, Vassar.
C. W. Clark, M. D., Health Officer Indian Fields Township, Caro.
W. C. Meredith, M. D., Health Officer, Caro.
J. C. Johnson, M. D., Health Officer, Adrian.
Guy L. Kiefer, M. D., Health Officer, Detroit.
W. DeLano, M. D., ex-Health Officer, Grand Rapids.
Samuel Stevenson, M. D., Health Officer, Morenci.
Frank Wells, President State Board of Health, Lansing.
Henry B. Baker, M. D., Secretary State Board of Health, Lansing.
Theodore Schmalzriedt, M. D., Health Officer Woodmere Village and Springwells Township, Woodmere.
Henry McCrea, M. D., Health Officer Marlette Township, Marlette.
Collins H. Johnston, M. D., Member State Board of Health, Grand Rapids.
Wellington M. Powers, Benzonia.
W. S. Walkley, M. D., Health Officer, Grand Haven.
P. J. Noer, M. D., Health Officer, Menominee.
G. R. Pray, M. D., Prison Physician, Jackson.
J. C. Harter, Food and Sanitary Inspector, Jackson.
S. D. Yerington, M. D., Health Officer, McBain.
Byron B. Godfrey, M. D., Health Officer, Holland City.
A. F. Hagadorn, M. D., Health Officer, West Bay City.
Milton Chase, M. D., Health Officer, Otsego.
A. S. Cornell, M. D., Health Officer Union Township, Union City.
George Newberry, Rochester.
Will L. Cole, M. D., Health Officer, Oxford.
C. M. Stuck, M. D., Health Officer, Plainwell.
I. Ohlinger, M. D., Health Officer, Belding.
James A. Stringham, M. D., Health Officer Bloomer Township, Carson City.
William Richardson, M. D., Health Officer, Carson City.
Thomas N. Frost, Health Officer Oakland Township, Goodison.
J. H. Lewis, Health Officer Tittabawassee Township, Freeland.
Henry Moeller, Supervisor Monitor Township and President Local Board of Health, West Bay City.
Charles H. Lewis, Health Officer East Grand Rapids Village, Grand Rapids, Station F.
Karl L. Loveland, Health Officer Prairieville Township, Prairieville.
C. H. McKain, M. D., Health Officer Brady Township, Vicksburg.
W. A. Wellemeyere, M. D., Health Officer Vassar Township, Vassar.
T. J. Jackson, M. D., Health Officer Milford Village and Township, Milford.
D. J. Erwin, M. D., Health Officer, Lake City.
S. H. Lake, Health Officer, Montrose.
A. S. Austin, M. D., Health Officer, Fowlerville.
J. E. Browne, Health Officer, Howell.

William J. DeLano, Supervisor Baltimore Township and President Local Board of Health, Prichardville.

George H. Townsend, M. D., Health Officer Onondaga Township, Onondaga.

Robert W. Work, Health Officer Fawn River Township, Fawn River.

J. Vaughan, M. D., Health Officer Cambridge Township, Springville.

C. L. Wilbur, M. D., Chief Vital Statistics, Department of State, Lansing.

Julius Krieger, Health Officer Blumfield Township, R. No. 2, Reese.

James LeVan, Health Officer Livonia Township, R. No. 3, Plymouth.

F. B. Adams, M. D., Health Officer, Plymouth.

George W. Palmer, M. D., Health Officer, Chelsea.

G. R. Breckon, M. D., Health Officer Caledonia Township, Caledonia.

A. L. Taylor, M. D., Health Officer, Middleville.

A. F. Fischer, M. D., Health Officer Torch Lake Township, South Lake Linden.

J. E. Scallon, M. D., Health Officer, Hancock.

B. G. Monkman, M. D., Health Officer, Delray.

D. W. Roos, M. D., Health Officer, South Frankfort.

D. P. Deming, M. D., Health Officer, Cass City.

D. A. Hatt, M. D., Health Officer Royal Oak Township, Royal Oak.

A. R. Stealy, M. D. Health Officer, Charlotte.

Henry A. Haigh, Member State Board of Health, Detroit.

S. B. Frankhauser, M. D., Health Officer, Hillsdale.

E. M. Vardon, M. D., Health Officer Hanover Township, Hanover.

Frank S. Pierce, M. D., Health Officer Beaverton Village and Township, Beaverton.

Henry Hull, M. D., Health Officer Ravenna Township, Ravenna.

R. J. Davison, M. D., Health Officer, Shelby.

F. Taylor, M. D., Health Officer, Shepherd.

M. D. Ryan, M. D., Health Officer, Saginaw.

D. J. McCall, M. D., Health Officer, Elkton.

J. E. Hinkson, M. D., Health Officer Watertown Township, Wacousta.

George C. Hafford, M. D., Health Officer, Albion.

W. T. Atkinson, M. D., Health Officer, Marlette.

L. M. Gillette, M. D., Health Officer, Battle Creek.

Joseph Trudell, Red Jacket.

Grant M. Morse, State Game and Fish Warden, Portland.

H. S. Smith, M. D., Health Officer, Schoolcraft.

A. E. Unger, M. D., Health Officer, Dundee.

A. R. Lusty, M. D., Health Officer Dundee Township, Dundee.

V. C. Vaughan, M. D., Ph. D., Director of the State Laboratory of Hygiene, and Dean of the Medical Faculty in the University, Ann Arbor.

Helen Balcom, Ann Arbor.

Rev. Caroline Bartlett Crane, Kalamazoo.

J. V. Dooling, M. D., Health Officer, St. Johns.

A. J. Weitenberner, M. D., Health Officer Hamtramck Township, Detroit.

Arthur R. Reynolds, Commissioner of Health, Chicago, Illinois.

E. B. Gibson, M. D., Health Officer Pittsfield Township, Ypsilanti.

C. R. Wilcoxson, M. D., Health Officer, Ypsilanti.

T. M. Koon, M. D., Health Officer, Grand Rapids.

FIRST SESSION, THURSDAY, JANUARY 15, AT 2:00 P. M.

The conference assembled in the new medical building, University of Michigan, and was called to order by Dr. Victor C. Vaughan, chairman of the committee of arrangements, at 2:30 p. m.

Hon Frank Wells, President of the State Board of Health, was elected chairman of the conference. J. M. Cooper was appointed Secretary.

Dr. Angell being detained, Hon. Frank Wells, read his Introductory Address. Mr. Wells said:

GENTLEMEN: This conference is called by the Michigan State Board of Health. but we want you all to bear in mind that it is your conference. It is held for the purpose of bringing as many of the health officers of the State together as possible, in order that they may compare notes with each other, come into closer touch with the State Board of Health, and learn from the various addresses that are to be delivered something that may aid them in their work.

INTRODUCTORY ADDRESS.

BY HON. FRANK WELLS, PRESIDENT OF THE STATE BOARD OF HEALTH.

The most valuable official any community can possess is a competent, energetic and tactful health officer. A municipality fortunate enough to secure such an one should never let him go so long as he is willing to faithfully perform the often onerous and disagreeable duties he will be called upon to discharge. Though nominally but the executive officer of a board, yet it is upon his unaided judgment and promptness that communities must rely to prevent the spread of those diseases which cause more than half the deaths of human beings. No position of trust can be equal in importance to that which guards those dearest interests of humanity, health and life. Unfortunately the absolute necessity for a competent health officer to preserve these interests is quite frequently not appreciated, or is overlooked by the people and by boards of health. Still more unfortunate is the fact that boards of health and communities often fail to sustain those prompt and energetic actions on the part of health officers which in so many instances are needed to prevent the spread of communicable diseases.

The political changes which result in placing new officials every year in power in the towns and villages of the State, adds another important element of weakness to the public health service of the State.

A new health board is quite likely to appoint a new health officer without properly considering the value to his constituents of the experience and other qualities of the one superseded. One other reason exists why health officers are sometimes chosen who do not possess those qualifica-

tions which a proper administration of this important office demands. This is the meagre salary frequently paid the township or village health officer. This remuneration is often insufficient to compensate a physician in good practice for the time he is obliged to devote to public health interests, without considering losses of patronage which few escape who properly perform their duties. Under these circumstances, that there should be so few unqualified health officers in Michigan is a matter of surprise. In but three jurisdictions in Michigan, out of nearly 1,600, has there been a failure on the part of local boards to report to the State Board the appointment of a health officer. In one of these jurisdictions, and the *only* township in the State which failed to return the name of a health officer for the year 1902, a demand for an annual report, through the supervisor of the township, elicited the following response: "I have nothing to report. I am not a doctor or a school graduate. Am a coon hunter. Have notified your office to that effect several times."

Progress of knowledge concerning communicable diseases and how they may be restricted must gradually bring to people a realization of the importance of the duties devolving upon health officers. This progress will be marked by a demand in communities that the person selected for health officer shall be thoroughly qualified to perform the duties of the office; the retaining of such a person in office without regard to political changes; liberal compensation for services rendered by him, and cheerful acquiescence in the often disagreeable steps necessary to be taken by a health officer in restricting the spread of a communicable disease as soon as an outbreak of such a disease occurs. The health officers in attendance here today either represent communities which have acquired sufficient knowledge to realize the importance to their health interests of sending a delegate to this conference, or the officer himself has realized it, and is here at his own expense. In either case it is safe to assume, gentlemen, that you represent the highest type of Michigan health officials. You are none of you coon hunters.

In saying this I mean no disparagement to many of your brethren who, for various causes, are not present. I prefer to believe that the local health service of Michigan is mainly in good hands, and that the exceptions to this are not so numerous as the comparatively small proportion of the entire number in attendance so far at this conference might indicate. It is upon this local health service that the State Board of Health must in the future, as it has in the past, rely to carry forward those aggressive campaigns against the foes of life and health as one after another these foes appear to menace the dearest interests of our homes. While many of these enemies have been nearly vanquished, there are others which are hurrying to premature graves the best of our land, against whom the warfare has scarcely yet begun. Let us consider for a moment some of the victories thus far attained, which seem to be due to the efforts of the combined health service of the State, and also some of the conflicts yet to be waged by this service. About twenty-nine years ago the State Board of Health was organized, and began its work. Few diseases were at that time believed to be communicable, and no disease producing germ had been discovered. The Board very soon directed its attention to the diseases then considered contagious, or as we now more correctly, I believe, style them, communicable. They were smallpox, measles, whooping-cough, and scarlet fever. Isolation of those sick with these diseases and thorough disinfection of rooms occupied by them, after

recovery or death, was recommended, and leaflets urging coöperation in these measures, together with vaccination as the only means for preventing the spread of smallpox, were furnished to local health officers to be distributed to the families and neighbors of those sick with any of them. Diphtheria was subsequently placed in the list of diseases requiring isolation and disinfection; and the danger of contracting typhoid fever through the drinking of water from the ordinary shallow wells was pointed out. These methods, with which you are all so familiar, have been continued to the present time. They have been eminently successful, and all these diseases which early received the special attention of this Board. each of which had been epidemic in some portion of the State almost continuously, and several of them extremely fatal, are now far in the rear of those which the Board has done but comparatively little to restrict. From the bulletin issued by the Vital Statistics Department of the Secretary of State's office we learn that the six diseases, named after classing diphtheria and croup as one disease, and including typhoid fever, caused in 1901 but one thousand six hundred and seventy-eight deaths.

From the same source we learn that consumption, pneumonia and the diarrheal diseases of children under two years caused 7,084 deaths. Less than one-fourth the number of deaths from six diseases, to most of which the Board has continuously devoted its energies since its organization, than there were from three diseases which, with one exception, the Board has done but little to restrict. This exception, consumption, the Board has been endeavoring to combat for about ten years, and during the latter portion of this period its efforts in this direction have been most active. Since these efforts began, the disease has been gradually and quite regularly diminishing, and it is easy to believe that the time is not far distant when deaths from this historic enemy will be at least as few as those from scarlet fever or measles.

Could evidence of the efficiency of public health work be stronger than this striking fact, that the six prominent diseases which the health authorities have dealt with for a quarter of a century are causing less than one-fourth the deaths resulting from three diseases for the restriction of which, with a single exception, but little has as yet been attempted?

It may be asked why has not the same effort been made to reduce the mortality from consumption, pneumonia and infantile diarrhea that there has been for scarlet fever, diphtheria, typhoid fever, measles, whooping-cough, and smallpox. Answering for the State Board of Health, this reason, so far as it is concerned, is the difficulty of obtaining coöperation in its efforts. The law gives the State Board but little power except such as it can wield by means of education. Since it placed consumption in the list of diseases dangerous to the public health it has labored diligently to induce physicians and householders to report cases of it to local health officers to be by them reported to the State Board. While a constantly increasing number are doing this, yet a very large proportion still refuse, for various reasons, to make reports which will enable the State Board to act. This has been the experience of the Board in its first labors with other diseases, in the past, and such experience has demonstrated that successful efforts depend upon a coöperation only to be obtained through an educational process which will convince the community of the importance of such efforts.

It is difficult to convince many people that a disease they have been

familiar with all their lives is communicated from the sick to the well in some mysterious manner. Some think it absurd to isolate the sick even for the best known communicable diseases, while others consider it as evidence of cowardice to refuse to visit them in their homes.

The disease which has excited most interest in Michigan during the past year and still continues to do so is smallpox. As predicted at the last meeting of this conference in November, 1901, this disease during the last winter spread quite generally over the State. It is a cold weather disease, and during the past summer it very nearly disappeared. It has been rapidly increasing during the last two months, and today fifty places have one or more cases of smallpox. It continues to maintain its mild form and if it were not for its loathsomeness and the old time horror which it inspires, but little attention would be given it. Very few cases have occurred among the vaccinated, and if general vaccination and revaccination of all who are not in this way protected could be accomplished, it would at once disappear.

During the year 1902 there were 702 outbreaks of smallpox, and over 6,000 cases. Only forty-one of this large number of cases proved fatal. This small proportion of deaths to cases shows the mild type which characterizes this epidemic. It has been feared by many that the disease would in time assume its old time virulence. But that tendency has not prevailed thus far, for in 1901 there were over 3,000 cases with twenty-seven deaths,—a slightly greater fatality rate than in 1902.

Smallpox has demanded more attention from the office of the State Board of Health and the Board's Communicable Disease Inspector and, perhaps, from local health officials in Michigan during the past year than any other disease of its class, and yet one of these diseases alone, pneumonia, caused not forty-one deaths, but 3,000. Both are communicable and, therefore, preventable. The mildness of one, due, perhaps, to influences in the tropical country from which it was brought, or to the cumulative effect of a century of vaccinated ancestors, offers a striking contrast to the fatality which marks the unrestricted progress of the latter.

While in no degree relaxing its vigilance in holding in check and in still further restricting the diseases with which it has been for many years contending, the health service of Michigan should now extend its labors and seek by every means which experience and scientific knowledge can suggest to diminish the ravages of those other diseases which so largely make up the mortality records of our State.

The work of the public health service of Michigan has never been spectacular. It has challenged the attention of few observers except those engaged in similar labors in this and other states. The advanced positions it has taken on several occasions have excited the fears of its friends that it would be compelled to retreat from these positions, and the animosity of others, who for various reasons desired it to do so. But the positions have all been held, and the value of this service seems to be well attested by the reports of the United States Census Department for 1900. While the enumeration of that department is alone of little value, the statistician claiming a deficiency of about forty per cent, yet it makes use of the records of such states as maintain a record showing at least ninety per cent of deaths reported. These, corrected by the enumerators [illegible], furnish a fairly accurate record of the mortality in nine

states and the District of Columbia. These states are Maine, Massachusetts, New Hampshire, Connecticut, New Jersey, New York, Rhode Island, Vermont, Michigan, and the District of Columbia. The number of deaths per thousand for the Census Year 1900 in these states, except Michigan, varied from 17 in Connecticut and Vermont to 19.1 in Rhode Island. The average of them all, including the District of Columbia, being 18.3, while the rate for Michigan was 13.9. Within the registration area of the United States Census there were, therefore, one-third more deaths per thousand inhabitants than there were in a State which its early surveyors declared to be too unhealthy for human beings to live in, the State of Michigan.

In his address to the Michigan House of Representatives at the time of his election, Speaker Carton used these words concerning this State: "Michigan is one of the grandest states in the great sisterhood of commonwealths which make up the Union. Her verdant hills and fruitful valleys are dotted and crowned with schoolhouses and churches. Her school system stands in the very front rank, and her people are as progressive and intelligent as the people of any state in the Union. She has long been famed for her agricultural productions, and her great mineral wealth; as a manufacturing State she has already taken a leading position among the great manufacturing states in the Union."

I am glad to reproduce these truthful and eloquent sentences from Speaker Carton's address, and I thank him for the opportunity it gives me to add to the list of the attractions of our State that one which I believe to be of even more value than any of those which he enumerates. That attraction is the fact that in Michigan the average deaths per thousand of its citizens is nearly five less each year than is the average deaths per thousand of the citizens of the other states of the union of which we have an approximately correct record.

Governor A. T. Bliss was to have addressed the conference on "The Interest of the State in Public Health Work," but was unable to be present. The following communication from Governor Bliss was read:

Hon. Frank Wells, President State Board of Health:

DEAR SIR:—I regret that because of pressing official duties in connection with the session of the State Legislature it will be impossible for me to attend the General Conference of Health Officials in Michigan, held under the auspices of the State Board of Health. My wish is that you may have a most instructive and successful meeting.

Yours truly,
A. T. BLISS.

Dr. Victor C. Vaughan then spoke, and the stenographer's report of his address is as follows:

THE RELATION OF THE STATE LABORATORY OF HYGIENE TO THE HEALTH WORK OF THE STATE.

BY VICTOR C. VAUGHAN, M. D., DIRECTOR OF THE STATE LABORATORY OF HYGIENE, AND DEAN OF THE MEDICAL FACULTY IN THE UNIVERSITY, ANN ARBOR.

A very brief resumé of the history of the hygienic laboratory may be very properly introduced here. In 1886 the Michigan State Board of Health memorialized the Board of Regents of the University of Michigan, asking for the establishment of a State Laboratory of Hygiene in connection with the University. A number of associations in the State took up the matter, notably the Business Men's Association and the Dairymen's Association. A bill was introduced into the legislature of 1887 making an appropriation for this laboratory. The bill passed with an appropriation of $75,000. This was vetoed by the Governor, and the bill was subsequently passed with an appropriation of $35,000.

I want to say here, parenthetically, that Michigan showed that it was in the advance ranks of sanitarians when it undertook this work at that time. I believe the first hygienic laboratory in the world was established in Munich in 1884, and this laboratory was presided over by that father of modern sanitation, the late lamented Professor Max von Pettenkofer. Two years after the establishment of the first hygienic laboratory in the world the Michigan State Board of Health asked the board of regents to establish such a laboratory, and the legislature by a unanimous vote in the senate, and by a nearly unanimous vote in the house, passed the appropriation, first at $75,000, and later, on account of the Governor's veto, at $35,000.

The request of the State Board of Health to the regents of the University for the establishment of such laboratory in this University stated the objects; and as Director of the Laboratory I have constantly held these in view in the work. The objects of the laboratory as stated in this memorial were:

1. The examination of food and drink and other things, which might affect the health of the people of the State of Michigan, for the health officers of the State.
2. Investigation or research into the causation of diseases, especially the infectious diseases; and
3. The instruction of students in matters pertaining to hygiene.

These were stated by the Board of Health in what was believed by the Board to be the order of their importance, and as Director of the Laboratory I constantly hold these in mind. We consider it our first duty in this laboratory to attend to any material which may be sent us by the health officers of the State, and it is my purpose this afternoon to speak upon that subject.

The health officers of the State have not been slow to avail themselves of the laboratory, although probably its uses have not been as widely and as generally understood as they should be. The laboratory was first opened in January, 1888, and since that time we have investigated, by

making water analyses for the health officers of this and surrounding states, over six hundred epidemics of typhoid fever; so you see that health officers have used the laboratory. We have made many analyses—I cannot give the number—of foods which have been supposed to have injurious effects, cheese, meat, preserves, adulterated milk, etc.

I want to speak particularly about some things which health officers send to the laboratory. First, about drinking water. Any health officer in the State of Michigan has the right to send to this laboratory for a sanitary analysis any sample of water which he suspects may be causing disease. The law provides that this shall be done at cost. It is impossible to accurately figure out the cost of the analysis of each sample of drinking water. The Board of Regents many years ago, in fact when the laboratory was first established, decided, upon my recommendation, that the local authorities who send these samples of water here should be charged ten dollars for each analysis, and this is much less than the actual cost. When we first began this work I sterilized bottles whenever a health officer wanted samples examined and sent the sterilized bottles to him to be filled; but knowledge of sterilization has advanced so markedly in the last fourteen years that I have not for a number of years past considered this necessary, so that any of you can at any time you wish send samples of water to be examined. You should pay the express on the samples, and you should have the proper authority of the village, city, or township send a check for ten dollars to James H. Wade, Secretary of the University, for each sample that you send.

I want to make my talk just as practical as I can, and therefore I want to take a few moments of your time in telling you how to collect and send the samples. The best receptacle in which to send the water is such a bottle as this (illustrating). It is generally known as an acid bottle, and can be obtained at almost any place where there is a drug store. It is a glass stoppered bottle, holding from two to three quarts. The bottle should be sterilized. There are many ways in which this can be done. A very simple, easy and efficient method of sterilization is this: Take a five per cent solution of carbolic acid. Fill the bottle full of this, laying the stopper in a dish containing more of the five per cent solution of carbolic acid. Allow the bottle to stand with this solution in it for thirty minutes. Then empty out the solution without touching the neck of the bottle with the hands. Fill the bottle with the water to be examined three or four times, emptying it each time after filling it. This is for the purpose of removing the excess of carbolic acid that would otherwise adhere to the bottle. After this has been done three or four times take up the stopper, being careful to touch only the outer portion. Take it up directly from the carbolic acid, rinse it in the water which is to be examined, and put it in its place in the bottle; put a little paraffine around the stopper so that it will not be displaced, and send it by express, directing it to the Hygienic Laboratory, University of Michigan, Ann Arbor, Michigan. Do not direct it to any person, but send it direct to the Hygienic Laboratory. Sometimes these bottles come directed to the University of Michigan. They lie in the secretary's office possibly a week or a month before I hear anything about them. Sometimes they come addressed to the Pathological Laboratory and go to another building altogether, and the man over there does not know what it means, and the result is that we do not get the bottle.

What do we do with this water when we get it? The rule in the

laboratory is, whenever a sample of water comes in, somebody is to stop whatever work he may be doing and immediately begin the analysis of that water. It matters not how pressing the other work may be, the analysis of that water is begun the very day it is received, and usually within an hour. We never neglect it. The University pays a small salary to one man whose business it is to attend to the water, and if he should happen to be away for any reason somebody else does it promptly.

You may be interested in knowing just what we do. By means of sterilized pipettes we take up some of the water from this bottle and we make the ordinary plate cultures. These are set aside in order to determine the number of germs in each cubic centimeter or in each drop of the water. At the same time we take not less than three sterilized beef tea tubes and put in one one drop of the water, in another one-half cubic centimeter, or ten drops of the water, and in another one cubic centimeter, or twenty drops of the water. These beef tea tubes, inoculated with the water, are placed in the thermostat or incubator, the temperature of which is kept just a little above that of the human body. Most water germs do not grow at this temperature, but only at lower temperatures. Very rarely it happens that there is absolutely no growth in the beef tea at the end of twenty-four hours. However, when this happens, I suspect, and it generally turns out to be true, that the health officer in his zeal to do the thing right, has sterilized the water. This has happened in more than one instance; the doctor boils the water before he sends it to me. In this case, of course, the analysis is worth nothing. It has happened two or three times in the many hundreds of examinations which we have made that the water contains no germs which will grow at the temperature of the body. When this does happen I send to the health officer the report that this water cannot cause disease. There is absolutely no doubt about it. There is no germ in it which will grow at the temperature of the body.

As a rule, there are germs growing in the water at the end of twenty-four hours. Now, we take guinea pigs or rats and inject into the abdominal cavities of these animals from one to two cubic centimeters of this beef tea culture which has grown for twenty-four hours. If there be present any pathogenic germ, which we are likely to find in the waters in this section of the country the animal is dead in twelve hours. We inject a large amount for the purpose of getting positive and prompt testimony. Now if the animal dies we do not report that the water is capable of causing disease, because used in this way it might kill animals without inducing disease in man. If the animal does not die then we say that the water is a safe drinking water.

If the animal does die, we then make plate cultures from the heart's blood of the dead animal. Bear in mind that we have originally made a plate from the water. Now, we make a plate from the heart's blood of the dead animal. The germ that is on both of these plates is the one that we are after. There may be a dozen other germs in the water, but at present we do not care about them. We want the germ which came from the heart's blood of the animal and which was also found in the water. If the germ found in the heart's blood of the animal is not found on the plate made from the water as it came then there is something wrong with the experiment. We have gotten in a new germ from the outside in some way, and we have to go through with the work again.

Then this germ is taken and grown in cultures and a determination

made, not as to whether it is a typhoid germ or not, we do not know enough to be able to say that it is a typhoid or non-typhoid germ, but as to whether it is a typhoid-like germ, or whether it is a colon germ, or the pyocyaneus, or some other. We distinguish between the colon germs as one group, and the typhoid-like germs as another. If the germ belongs to the typhoid group,—whether it is the typhoid germ or not,—then we condemn the use of the water. We have used this method for fourteen years, and I am sure that there is no other method which could give such exact information and give it so promptly.

For instance, samples of water from almost every possible local source were sent us awhile ago from Ironwood in the northern peninsula. There was a fearful epidemic of typhoid fever there. They sent water from the public supply, water from the public schools, water from the hotels, and from wells, cisterns, etc. The only water sent from Ironwood at that time that contained the typhoid like germ was the water taken from the public supply, and as soon as they stopped using that water, or began to boil it, the epidemic of typhoid fever ceased. This has happened in numerous instances. I do not claim that this method is infallible, we may make mistakes; but there is nothing human, so far as I know, that is not liable to error. Of course, it depends upon whether we get in the water which we put into the beef tea all of the germs which are in the water, but as a rule we do.

A water may be very dirty, and still not be capable of inducing any disease. A few years ago samples of water were sent us from Iron Mountain. Samples from the public supply, drawn from Lake Antoine, were positively filthy. The water had a bad odor, but it contained no typhoid-like germs. The water taken from the shallow wells in the city was clear, bright and sparkling, but still it contained numerous typhoid-like germs. This was in the early Spring, and we reported that the people could use the public water supply with impunity, but must not use the water from the shallow wells. Doctors know that one of the things which a man, who has a household, prides himself on is the water in his well. He may admit that his liver is out of order, that his blood is diseased, but he knows that he has the best water in his well that is to be found in the city. Now the people who had wells giving this bright, sparkling water refused to cease drinking it. The public health officer put locks on the pump handles in a number of cases, but the people broke the locks and continued to use the water. He took out the pumps in some cases, but they tore off the boards and still used the water, and during that summer they had several hundred cases of typhoid. I was asked to come up there in the fall with the rest of the State Board, and Mr. Wells and others will bear me out that I asked at a public meeting whether anyone could report an instance of a person who confined himself to the public water supply who had typhoid fever, but no one knew of a case. They said that the horses would not drink the public water, and we replied by saying that they should have more sense than the horses.

I believe that this is all that I need to say to you concerning the examination of drinking water. There may be numerous questions which you will like to ask me after I get through.

We will pass on to some of the other things examined. I mentioned samples of food. We have received many hundred samples of cheese for examination. The number of poisons in cheese, the so-called American

green cheese, is large. There are very few cases of cheese poisoning that are due to tyrotoxicon. In most of the cases of cheese poisoning the poisonous agent is the colon bacillus, which is undoubtedly obtained from the fecal matter of the cow. Two or three years ago, with an assistant, I spent nearly the whole year in examining different kinds of cheese. We examined the cheese made by sixty-three different manufacturers. We examined cheese from every cheese making establishment in Michigan, from a number in Wisconsin, Ontario, New York, Illinois, and Ohio, and in every sample of so-called green cheese, the ordinary American cheese, we found the colon bacillus, and it is simply a question as to the amount of the bacillary substance in the cheese as to whether it will cause nausea and vomiting or not. We will not get rid of these poisons until every dairyman learns to take care of his cows properly, to wash the udders before milking, and to have the hands of the milkman or milkmaid properly cleansed, and to have the milk received into sterile receptacles. No death, so far as I know, has ever occurred from these colon toxins in cheese. The more powerful poisons rarely found in cheese may cause death, but I know of no instances of death from the colon germ in cheese. Again, only two or three days ago a health officer brought to the laboratory a sample of cheese and stated that this cheese had been cut and different people had eaten different portions, and some had been poisoned and some had not; and he could not understand it. The colon germ was not evenly distributed through the cheese. There were found colonies here and there.

In sending samples of cheese or any other food, no special precautions are necessary. You can simply wrap the cheese in a piece of paper, put it in a little box, and send it either by mail or express. When we receive cheese we take a sterilized knife and make a section through the cheese, so as to get a fresh surface which has not been exposed to the air or the hand or the paper, or has come into contact with anything, and then with a sterilized platinum needle we take a little out of this clean cut surface and inoculate beef tea tubes and find out the germs present very much as in the case of the water.

The same is true of poisonous meat, poisonous chicken pies, etc. We have examined many of these samples during the last fourteen years.

We also examine samples of membrane supposed to be diphtheritic. I dare say that the health officers who need instruction on this point are not here today. I wish that you could see some of the samples that come to the laboratory for examination. Some of them are taken in such a way as to endanger the life of everybody touching them from the time they are taken out of the child's throat until they reach the laboratory.

I have received great pieces of diphtheritic membrane rolled up in a cloth. I have received samples crowded down into a bottle, and a part of it on the outside of the bottle. Whenever I receive such a sample in such a condition I throw it into the fire as quick as I can. We cannot examine samples received in that way, and besides, it is dangerous to send samples in that way. I wrote to a health officer the other day scolding him for sending me such a sample. He replied, "I would not send you a piece of diphtheritic membrane without sterilizing it. I thoroughly sterilized that membrane before sending it." If he knew that all of our work depended upon the germ being alive when it got here he would have realized the predicament he was placing us in. Another man sent a sample rolled up in a piece of paper, in a paper box; and this officer was

an ex-president of a state medical society,—of course, not the regular state medical society, but *a* state medical society.

The way to prepare samples of diphtheritic membrane for examination I suppose all of you here know. You have two tubes, such as I hold in my hand here, one containing a sterilized swab, and the other being a culture tube of blood serum, which you can get from Parke, Davis & Company. Any druggist should keep them, or as health officer you certainly have the right to invest some of the funds of your neighborhood in them. It would not do for us to try to keep these tubes on hand and send them out when needed, because too much time would have to elapse. When you see a case you want an examination as soon as possible. These tubes can be carried in the vest pocket, and when you think there is a case of diphtheria you take the swab and draw it two or three times over the membrane in the child's throat. Then spread it over the surface of the culture medium. Drop the swab back into its tube and put the cotton plug back into it. Put the tubes into the vest pocket and after you get home send them to the laboratory. This is perfectly safe; nobody's life is endangered. You should have mailing boxes for these tubes, or you can wrap them up in cotton and send them by express. They should not be sent by mail unless in proper mailing boxes, as the law provides.

When we get this tube we make a culture from it on to another tube, or possibly two or three cultures. We put these tubes in the incubator at the body temperature for twelve to twenty-four hours and examine with the microscope, and if the diphtheria bacillus is there we detect it immediately. We have not made any charge for diphtheria examinations. Of course, if the patient is wealthy and wants to pay for it I presume the University would accept it, but we have never asked any fees for work of this kind. It is a matter of public urgency and for public good.

Unfortunately hydrophobia has prevailed to some extent in Michigan during the last two years. Dr. Novy is to have a paper on this subject so I will not go into it further than to speak of sending the material to the laboratory for examination. We have made a number of examinations in the last few years of material taken from rabid animals. We have received the brain and spinal cords of dogs put up in alcohol, strong solutions of formaldehyde and bichlorid of mercury and other disinfecting and hardening agents. It is needless to say that material received in any of these solutions is worthless so far as examination is concerned. The dog's head and spine, as soon as the dog is killed or dies, may be sent without opening. This is one way. In hot weather it is desirable not to do this. In cold weather, especially if hydrophobia occurs in some small place, I recommend this method: Kill the dog and cut away everything but the head and cord and send this to the laboratory. In the summer time, or at any other time for that matter, remove the brain and spinal cord and put these portions of the body into a twenty per cent solution of glycerin, one part of glycerin diluted with four parts of water, and send this by express.

We immediately take the material as soon as received, trephine a number of animals, generally rabbits and guinea pigs, lift the button of bone from the skull, and inject from one to two cubic centimeters of an emulsion of the cord or brain under the dura mater of the animals. If the animal from which the brain and cord were taken was rabid the inoculated animal develops the disease in a period varying from seven to twenty-one days.

Personally I would like to say just a few more words concerning this matter. The State Board of Health at a recent meeting recommended to township, village and municipal authorities throughout the State that all dogs running at large should be muzzled. So far as I know, hydrophobia first appeared in Michigan two years ago between Ypsilanti and Belleville. I saw the man who died of hydrophobia at that time, and we urged then that inasmuch as hydrophobia had been introduced into this section of the country, that all dogs should be muzzled. No attention was paid to this recommendation, and hydrophobia has gradually spread. I know myself of three deaths from hydrophobia in the State of Michigan in the last three months. A very large number of cattle have died from hydrophobia. I have received a number of letters from owners of herds of cattle, and generally there is a sameness about them. They usually say: "I have a fine herd of cattle. They began to die a few weeks ago, and are dying quite rapidly. I suspect one of my neighbors, or a man whom I once hired, of poisoning these cattle." I have told these people to send the stomach, brain and cord, and we have never found any poison, but in all of these cases we find that the animals have died from hydrophobia. I hope that you will bring out by questions anything that I have neglected to state in this talk.

DISCUSSION.

MR. WELLS: The subjects that are to be presented will all be open for discussion, and it is hoped that you will all feel free to talk upon them. This matter presented by Professor Vaughan is of a great deal of importance, since it offers a sure method of diagnosis of many of the communicable diseases.

DR. BAKER: Mr. Chairman, there are a number here who are interested in the method of sending sputum for examination. I do not know whether this was intentionally omitted or not, but I know there are a number here who would like to hear from Dr. Vaughan on this subject.

DR. VAUGHAN: This is so simple that I thought it unnecessary to mention it. In sending sputum for examination, obtain a wide-mouthed bottle, and then be sure that the material sent is sputum, and not saliva, and be sure that there is none of the material on the outside of the bottle. Send it by mail or express. In reporting I have usually said that if this examination is for a person abundantly able to pay for it, send me five dollars, and this I have put in my pocket, if I have made the examination. If the person is not able to pay for it I have made no charge. Neither have we charged anything for the examination of rabid animals.

DR. A. R. STEALY, Charlotte: There was a party telephoned me the other day, wanting to know something about sending material to be examined for hog cholera; and I would be glad to hear Professor Vaughan say something about this. What material should be sent, and how?

Dr. FRANK S. PIERCE, Beaverton: I would like to ask what to do with the that have died from hydrophobia.

DR. SAMUEL STEVENSON, Morenci: I would like to ask if there is any State law by which the muzzling of dogs can be compelled when hydrophobia develops in a community. The professor spoke of the difficulty of getting dogs muzzled. We had a case of this kind at Morenci. I tried to get the parties owning the dog to keep him confined, but he was let out, and died within thirty-six hours. The brain was sent here for analysis. Ten or twelve dogs were killed, but it amounted to almost a civil war to get people to take care of their canines. If a health officer insists on muzzling dogs people will hardly speak to him on the street. What is to be done in such a case? I do not know whether there is a law covering this point or not, and would like to know. We killed ten or eleven dogs in our city, and shut up others. Did we do right in this?

DR. VAUGHAN: I shall ask Dr. Novy to answer the question in regard to sending material for examination for hog cholera. I have no doubt that he can tell how and what material should be sent.

In regard to the disposal of cattle dead from hydrophobia. I see no reason why the cow dead of hydrophobia cannot be worked up into axle grease, or something of that kind. There is no reason why the hide should not be preserved. The carcass should be burned.

The law in regard to muzzling dogs is, as I understand it, that every community can establish its own rules about it. For instance, sometime ago we recommended that the authorities in Ann Arbor muzzle the dogs, and were informed at that time that it would be necessary for the common council to pass an ordinance requiring that dogs be muzzled for so many days, and that the policemen or city marshal be authorized to kill all dogs not so muzzled. The health officer, as I understand it, has no right to order the dogs muzzled; he does the best he can when he advises it, and if the people insist on taking the risk, he cannot help it.

When this man died of hydrophobia two years ago there were a good many people, and a few doctors, in the State who believed that there was no such thing as hydrophobia. They thought that the cases called hydrophobia were some nervous affection; but now there is no doubt in Michigan as to the existence of such a disease.

DR. NOVY: The simplest way of sending material for examination as to the presence of hog cholera is to take the spleen of the animal and place it in a sterile vessel, if this can be obtained, or wrapped in a cloth soaked in bichlorid of mercury, and ship in this way. The spleen can then be examined in the laboratory according to our usual method.

ADDRESS OF WELCOME.

BY JAMES B. ANGELL, LL.D., PRESIDENT OF THE UNIVERSITY OF MICHIGAN, ANN ARBOR.

I was sorry that I was necessarily detained at the opening of your session. It is hardly necessary, except as a matter of courtesy, for me to say, as I have had occasion to say before, in behalf of the authorities of the University, that we feel highly honored by your presence at these meetings. We look forward to them with pleasure and profit to ourselves.

I am of the opinion that these local boards of health are the most important boards we have in Michigan. I know of no other board whose work comes closer to the dearest interests of the people of Michigan than these boards of health. Your function is, as I understand it, to guard our communities against perils which are threatening them on all sides, and to help us to relieve ourselves of such misfortunes as come upon us. I have great sympathy with these boards, especially from what I have seen of their trials and tribulations, as our friend from Lansing has just been illustrating. The most extraordinary thing about our intelligent population is that they are so little interested in the question of the preservation of public health. How often you find that when you are called upon to placard a house for a dangerous disease the inmates are thoroughly indignant, and the neighbors only less so, and when the necessity for vaccination comes, it seems to develop a weakness which is enduring beyond all expectation. One would think that by this time the fact would be understood that the safety of communities with regard to smallpox depends largely upon vaccination. We had a little experiment with this here in the University a few years ago. We found just before the winter vacation that according to Dr. Baker's statement there was smallpox in about one hundred and fifty or sixty places in Michigan, especially in northern Michigan, and a large proportion of our students come from Michigan towns. They were all to go home and many of them would go into infected districts, and so it was concluded that the only safety for the great population in the University was to insist that every student should be vaccinated, if he had not been recently, before he took his place in the classes. A placard was posted on all the doors in the University,—I do not yet know whether I really had authority or not,—that no student should be permitted to join his classes unless he could show that he had been vaccinated within a recent time, until he had been vaccinated, and we offered to furnish the means for gratuitous vaccination. It is a rather encouraging fact that of the thirty-five hundred students that we had here there were only just two who finally refused to be vaccinated. I told these two, "Very well, take your choice." They admitted that this was just. The reason one of these gave was that he was a Dowieite. I reasoned with him and the only reason he could give was that he did not believe in medicine. His mother was also a Dowieite, and she also thought as he did. I said to him, "You are part of a big society here. It is not on your account alone, but also for

the sake of the others. Do you think you have any right whatever to subject them to the perils of death from smallpox? Would you not feel very badly if you should take it, and others should die in consequence?" He said that he would, and so finally went home. I need not go into the particulars of the other case. However, all were vaccinated except these two, and we did not have a case of smallpox. Students from other institutions who went back into these localities did have smallpox.

I quite sympathize with you in the trials which you have to encounter in trying to do good to your neighbor. We are all hoping that with the spread of intelligence a happier day for such as you will come. During the last few years so many discoveries have been made in the prevention of disease that the duties and the privileges of boards of health have become vastly more important than ever before; and in spite of all the drawbacks we are inclined to believe that by virtue of these discoveries and inventions the average age of the human race is increasing, and certainly we trust that in this State, which we boast of as a State noted for its intelligence, the work that you are doing in your various neighborhoods will sooner or later be appreciated. We regard it as one of our highest privileges here to be of any service to you, and through you to the State, in these investigations. People sometimes wonder what good this University can render to the State. The hygienic laboratory at least is of real service to the State, and I know it is conducted by the intelligent and large hearted men who are in control here largely for the public good. Now that we are soon to go into this new building, the facilities which this laboratory and other departments will offer will be even greater, and we shall be of still larger service to you; and we trust that you will be free to call upon us for anything that we can do for the service of the State of Michigan. It is our great pride and joy to have members of our faculty called upon for public service in the State of Michigan. I am very glad to see you here and trust that this session will prove to be one of great interest and profit to you all.

MR. WELLS: On behalf of the health service of Michigan I want to thank President Angell for his address of welcome. It is a pleasure to be welcomed by such a person as Dr. Angell.

This seems to close the session for this afternoon, but if any questions are to be asked concerning the work gone over, we shall be glad to listen to them now.

DISCUSSION.

DR. J. J. OHLINGER, Belding: I would like to ask Dr. Baker how many reports of death from vaccination he has ever received. We hear very often through the newspapers that so many persons have died from vaccination, and I would like to know how true these reports are.

DR. BAKER: The State Board of Health has been organized for nearly thirty years, and I can hardly be sure that I remember all the cases that we have had in this time. There have been very few, however, of these cases. Those which we have traced out have been found to be due to some other cause than vaccination. I cannot give the exact number. Two years ago there was a report from the State Normal School at Ypsilanti of three instances of serious trouble after vaccination. In

these cases everyone on investigation proved to be a mistake, and death was due to another cause.

DR. HARVEY GILBERT, Bay City: I do not know whether I have a proper conception of the status of this conference, but I notice the statement here under the "Objects of the Conference", "The presentation of facts and the general comparison of views by the health officers and other delegates of local boards of health, among themselves, with the members of the State Board of Health, and with those in charge of the State Laboratory of Hygiene, and especially with reference to the duties of health officers, and other matters bearing upon the public health service of the State." I take it for granted that this is a representative body, and that every gentleman here, either member of the State Board, or a local board, is here for the purpose of representing his board, and for the benefit of his constituents. I find on looking over this program that out of sixteen hundred health officers that there is only one health officer in this vast State that is of importanec enought to find a place upon this program. I think that it is lamentable that this is true. I do not know where the blame attaches. It may be that we are of the class of which Dr. Vaughan spoke, who do not know when to sterilize and when not to sterilize. Every health officer present will recognize that we are in pretty close touch with the community which we represent. There is not a doctor here but that feels that he is nearer the field of operations than others who have the privileges of this great institution, or who sit under the dome of the capitol. I came over on the train today with two men who are members of the board of supervisors, one of the county of Bay, and the other of an adjoining county. The gentleman from Bay county stated that that county had paid out for the care of smallpox patients during the last epidemic over thirty thousand dollars, and there had been spent during this same epidemic over a million and a half of dollars in the State of Michigan to restrict a disease which is not as fatal as the old seven years' itch. Only two per cent of those affected have died of smallpox. Not as many as have died from measles or chicken-pox, scarcely. We have to meet the board of supervisors on this question, and they feel that something should be done to amend the laws to make it so that the business of caring for contagious diseases shall come more nearly into the hands of the people of the affected community. A community comes up to the board of supervisors with its bills, which are often large, and they naturally do not like to pay them. One doctor, who is the only physician in his township, came up to the board with a bill of seventy-five dollars for fumigating a bunch of shingles. The law of the State permits this, and leaves the board of supervisors absolutely helpless to take care of such cases.

These are questions that come up to us, and which we must meet. I make this motion, Mr. President, because I believe that it will meet with the approval of many of the members present: I move that, in the words of this announcement, the presentation of facts and the general comparison of views by health officers and other delegates of local boards of health, shall be the first order of business during the sessions of this conference, succeeding this.

DR. BAKER: The program is made and printed, and some might depend upon this for their attendance, and might be thrown out of hearing what

they had come a long distance to hear. I would like to ask if Dr. Gilbert would not modify this so as to read, "at the close of each session." I believe this would better suit the needs of the conference.

DR. GILBERT: I cheerfully accept the amendment. It is not for the purpose of thrusting the members of local boards forward, but I feel that there should be a time every session when these persons can talk upon subjects which they can handle. There are people here who want to talk on certian subjects, regarding the amending of certain laws. These questions ought to be discussed. The question of the impurities in the Saginaw river is one of these, and there is nothing in the laws of the State at present which can touch this. The State Board of Health is to be granted the power to ask for amendments to our laws. Give us an opportunity as health officers to bring these questions forward.

DR. MILTON CHASE, Otsego: A little matter pertaining to health officers' work and the method of procedure, I want to illustrate. We had a scare sometime ago in regard to a dog that was supposed to be mad, and at that time had an ordinance passed instructing the marshal to see that all dogs at large were muzzled, meaning that any dog away from the premises of its owner, and not led by a chain, should be muzzled. The motion prevailed in the council, but as soon as it was carried one of the council said that if the marshal interfered with his dog he would interefere with him, and if he killed his dog, he would kill him. The president of the council said: "If he muzzles my dog, I will spoil his muzzle for him." The result was that no dogs were interfered with. It shows the dilemma that we may get into in trying to enforce a law that the people do not think is a necessity.

DR. W. C. MEREDITH, Caro: I would like to ask Dr. Baker in regard to a resolution adopted by the State Board of Health, "That it is the sense of the Board that health officers should in all cases accept the diagnosis of attending physicians, without question." What is my duty as a health officer if a man is seen by me on the street with the smallpox, which his doctor says is chicken-pox?

DR. BAKER: You have left out the important point. The resolution reads, "Whenever a physician reports a disease as being a dangerous communicable disease then the health officer is to accept the diagnosis."

DR. MEREDITH: There was a case of scarlet fever in a family at Caro, and the mother did not know where the child caught the disease. I happened to go to one of the neighbors, and noted that the man's hands were desquamating. He said that his feet were also desquamating, but that he had had no eruption. I told him that he had scarlet fever, and quarantined the house, and they were going to do things to me under the resolution.

We all admit that Dr. Baker is the right man in the right place, but we do not want any more such resolutions, and I think we had better wipe this one off the slate. I think I have told Dr. Baker that I refuse to sink my intelligence, and that I believe I know smallpox and chicken-pox and scarlet fever. The difficulty is that some doctors like to mini-

mize their cases, while others like to magnify them. Some call laryngitis diphtheria, and others call chicken-pox smallpox.

[Dr. Baker's reply to this is on a subsequent page.]

DR. J. E. BROWNE, Howell: Is the local board of health responsible for the fumigation fee, or can this be made a county charge?

DR. I. OHLINGER, Belding: It seems that we have a law on the statute books saying that the board of health shall immediately see that persons afflicted with contagious diseases are taken care of, nurses employed, and provisions supplied, but it does not say anything about who shall be the attending physician. In our part of the State we always supply the sick person with a physician. Shall the board of health hire the physician or shall the patient have the privilege of saying whom he will have to treat him, and is the board bound to ratify his choice?

DR. S. D. YERRINGTON, McBain: We have had something like twenty-five or thirty cases of smallpox, usually called Cuban itch, when it first appeared. The board of health hired a physician, but it did not work well at all. Various patients wished certain practitioners. It seems to me from the talk I have heard here that some boards of health are timorous in the discharge of their duty. Whenever we hear of a case of sickness from any unknown cause we do not wait until we get a report, or for the patient's consent. We simply invade the house and find out what the trouble is, and in many cases have found cases of smallpox, and have quarantined. In one case we found two little girls just preparing to go to school, across the township line. I investigated and reported smallpox in a mild form. I told them to wait until the health officer should visit them. The result was that both of us lost the family; but we did our duty.

During our vaccinations we vaccinated all who presented themselves with one exception. One person whom I have treated several times for erysipelas applied for vaccination. I refused to vaccinate this gentleman. Was this right or wrong?

DR. B. B. GODFREY, Holland: We have a sugar beet factory at Holland, and I would like to know what disposition is made of the pulp in other places. I have been requested repeatedly to take some action regarding the pulp. The company ascertains by bids who will dispose of the pulp the cheapest, and clears its skirts in this way. Wherever a dumping ground can be found, there it is deposited, sometimes within the city limits. So far as I can ascertain we have no authority to deal with these cases. I do not know that I have discovered any particular sickness as a result of this. A large portion of it is dumped into the lake, thus polluting the water. I would like very much to hear from some one here who knows what our position is.

DR. GILBERT, Bay City: I live upon the Saginaw river, which has nine of the largest sugar factories in Michigan upon its banks. The water has been thought to be impure from the immense amount of vegetable matter thrown into the river. Analysis at the Hygienic Laboratory has resulted in the statement that with the exception of a large amount of vegetable substance, which gives rise to a bad odor, there was no great impurity in

the water, and that it was a harmless beverage. This was at a time when the greatest amount of vegetable matter existed in the river. The oldest factory in Michigan was within a mile of my residence. The pulp has been piled on the bank of the Saginaw river for five winters, where it goes through a process of decomposition. There is a very offensive odor from it. I cannot say that it is an odor which will produce disease. What the effect of it on public health is I do not know. There is scarcely a person in Bay City who does not get the effect of this odor every day. It is a serious trouble to commerce and to fisheries, and this is why the people of Bay City are going to the legislature about it. If it was in my jurisdiction I could not go to court and ask the factories to be indicted for nuisance, with a possibility of succeeding, because a jury of twelve farmers would swear that a compost heap had been under their noses for years and they had never noticed any bad effect from it. The reason that I speak is because I believe that an expression from this conference to the legislature will have great weight in framing laws on this subject. We are supposed to represent our constituents, and come here as the guardians of the health of every municipality. I think we should formulate these opinions in some shape which can be submitted to the legislature.

I have gone over this with our prosecuting attorney and with other persons, and I do not exactly know how this should be submitted to the legislature. I believe it should be possible to prevent the accumulation and decomposition of these piles of pulp, and I think it is the duty of this conference to take hold of the subject.

Another burning question which I hope can be put in tangible form and which I believe is one of the duties of the health officers is that the health board should be the autocrat in the management of local affairs. What are we doing for funds? Thirty-six thousand dollars have been spent by Bay county alone in treating these smallpox cases, and not one of them has been fatal. There is something wrong, and the board of supervisors have asked me to take hold of this case. The board of supervisors wants to have the control of these conditions. We shall be handicapped until there is a definite understanding as to what shall be the duty of the local board of health. I would like to have a committee appointed to suggest amendments to the State laws, and to report:

On motion of Dr. Gilbert it was unanimously agreed that the chair appoint a committee of three to suggest amendments to the State health laws, and to report at a future session of this conference.

DR. BAKER: To further this object I would suggest that proposed amendments to the health laws be brought to the notice of the conference and referred to this committee. The committee then will have less work to do, if they have the aid of those who have in mind certain definite points.

A motion to this effect was made by Dr. Baker, and carried unanimously.

DR. CHASE, Otsego: I would like to have a line drawn between things which are unsanitary and things which are a nuisance. When I inspect anything of this kind I always report to the board in writing. I say that such a pile is composed of such and such things, and is a nuisance. Other things I find are unsanitary, and liable to cause disease, and then I say to the marshal that he is to order that thing cleaned up within twenty-four hours and to present a bill to the council. A nuisance cannot

be complained of under the general law, and private individuals can make it as well as a health officer, but when a thing is unsanitary, it is for the health officer to act promptly and peremptorily.

DR. BAKER: In regard to the resolution questioned by Dr. Meredith. There are certainly two sides to this question. I am here to speak for the other fellow, and not the health officer. The State Board of Health has often heard from the "other fellow," and very vigorously too, and this is the reason for the resolution. Let Dr. Meredith place himself back to the time when he was a young practitioner. He might recognize a disease as smallpox when two or three old physicians say that the disease is not smallpox. The health officer may be an older physician, and this makes it uncomfortable for the young physician.

Suppose the attending physician has seen these cases from the start. He would have a much better chance of judging than the health officer. He may have seen several cases in the vicinity before. It is then awkward for the health officer to prove himself guiltless if he declares there is no danger in the disease, notwithstanding the doctor has reported that there was. It may be exceedingly awkward for the health officer on his own account, besides the danger to the public health.

As to disinfecting houses at the instance of some doctor. Suppose this is done. It is very easy to place the blame where it belongs. The health officer says to the family, "This disease was reported to be such and such a disease by the attending physician," and he should, therefore, go on and do his work. The proper thing to do is to labor for the just compensation of the health officer.

I believe in the resolution myself, notwithstanding what has been said against it.

The resolution is worded so that the diagnosis is not to be taken if the health officer knows that there is a dangerous communicable disease which is not recognized by the attending physician.

Dr. Brown of Howell asked whether disinfecting was a local or county charge. I do not know exactly as to this. It is best to get it out of the county if possible. However, it certainly is not for the individual to pay. It is for the benefit of the public, and the public should pay. The law probably would place the expense on the local jurisdiction.

Dr. Godfrey spoke in regard to the beet sugar factories. This is to be dealt with tomorrow afternoon by Dr. Vaughan, in his paper on Sewerage into the Water Courses of Michigan. Although the subject on the program relates to water courses, I imagine that he will take up the discussion of it fully tomorrow.

Dr. Gilbert spoke of the payment of bills incurred for the care of persons suffering from communicable diseases by the township in preference to the county. For many years the State Board of Health has been laboring to secure the enactment of a law on the subject of making the charge, not against the county, but against the township, city or village in which the expense was incurred. In many places the local board of health will audit bills which are questionable, and which certainly would not be audited if they had to pay them in the township or village. Thus, localities which are now permitted to audit bills for someone else to pay will not be allowed to do this if this law can be passed. The present law is that these expenses are to be paid by the county. Some counties are getting tired of this already, and have made these expenses payable by

the township or village. The State Board is trying to get the legislature to pass a law making the charges payable by localities.

J. C. JOHNSON, Adrian: I am opposed to the localities paying these bills. I would not trust a jury of farmers. The local supervisor and health board engaged me to take care of several cases of smallpox, but would not O. K. the bills. In another case they were willing to O. K. the bills, but the county would not pay them. If the expense is put upon the local boards the bills never will be paid. People who work for a dollar and a half a day cannot pay these large bills locally. I believe that the county should bear the expense as a whole, and not the locality.

DR. GILBERT, Bay City: I do not think that the point made by Dr. Johnson is well taken. Every local board of health is the creature of the municipality, and not of the county. As local health officer I can arrange for the care and treatment of all persons sick with dangerous communicable diseases. Shall the municipality or the county pay the bills? Is it right to go before the board of supervisors with a bill O. K'd by a local board of health, which does not owe its existence to such board of supervisors? It may be according to the law, but if we try to impose upon the people even by law we are going to get tripped up. Let each municipality pay for the care of their contagious diseases.

J. C. JOHNSON, Adrian: One of our poorest townships had seven cases of smallpox this fall. There was a bill of nine hundred dollars, and it could not have been paid by the township if the whole township had been sold. The county paid it, and it was right that it should.

S. B. FRANKHAUSER, Hillsdale: I do not want this to turn into a public grievance meeting, but if it is to be such, I make a motion that each speaker be limited to half an hour, and not be allowed to speak more than ten times on any one subject. There have been arrangements made for a committee, and I think that the consideration of these questions should be left to their hands. I think these discussions should not have a place in our meeting.

On motion, the first session adjourned to meet in the same room at 8:00 p. m. Standard time. The chairman announced that the names of the committee on legislation would be read at the beginning of the evening session.

SECOND SESSION, THURSDAY, JANUARY 15, 1903, 8:00 P. M.

The Chair announced as the members of the Committee on Legislation the following: Dr. Gilbert, of Bay City, Dr. Koon, of Grand Rapids, and Dr. Smith, of Schoolcraft.

Arthur R. Reynolds, Commissioner of Health of the City of Chicago read the following paper on the increasing prevalence of pneumonia, and the necessity of measures for its restriction:

PNEUMONIA—THE NEW "CAPTAIN OF THE MEN OF DEATH;" ITS INCREASING PREVALENCE AND THE NECESSITY OF METHODS FOR ITS RESTRICTION.

BY ARTHUR R. REYNOLDS, M. D., COMMISSIONER OF HEALTH, CHICAGO.

Figures are hard reading and harder hearing; but I must ask you to listen to a few in order that you may comprehend the magnitude of the pneumonia problem as I view it.

In the latest (1901) edition of his scholarly and most instructive "Principles and Practice of Medicine," Professor William Osler, treating of pneumonia in the section of Specific Infectious Diseases, says: "The most wide-spread and fatal of all acute infectious diseases, pneumonia, is now the 'Captain of the Men of Death,' to use the phrase applied by John Bunyan to consumption." He then adds:

"In the United States, during the census year 1890, there died of it 76,496, a death rate per 100,000 of population of 186.94. In Chicago during the past ten years it has gradually replaced consumption as the principal cause of death, which A. R. Reynolds *attributes to the predisposing influence of influenza.* In the last decade the death rate [from pneumonia in Chicago] was 18.03 per 10,000 of population against 12.36 per 10,000 in the previous decade. There has been a marked increase in the disease in Baltimore, and Folsom has brought forward evidence to show that there has been a progressive increase in the death rate from pneumonia in the State of Massachusetts. The admission of pneumonia cases to hospitals during the past few years has, in some places, almost doubled."

These passages are cited for two purposes: First, that I may put their reader on his guard against the assumption that the great increase in pneumonia during the last ten or a dozen years is attributed by me solely "to the *predisposing influence of influenza.*" Second, that I may emphasize more fully than Prof. Osler has done, the extent of this increase, both in point of time and of proportion.

As to the first, it will probably be sufficient to call attention to the of the paper on which the assumption was based. This paper

appeared in the March. 1901, Bulletin of the Chicago Health Department and was entitled "Influenza as a Factor of Recent Mortality"—not the only, but one factor. That influenza has been such a factor and a very important one since December, 1889, is now admitted by etiologists generally. That the increase of pneumonia mortality is due solely to its predisposing influence is disproved by the following figures of deaths from all causes, of those from consumption, and of those from pneumonia, during the last thirty years:

In 1880 the death rate from all causes was 14.59 per thousand of the total population of the country; in 1900 it was 13.67—a decrease of 6.3 per cent in the general mortality rate during the twenty years.

The consumption death rate in 1880 was 18.21 per 10,000 of population and 12.46 per cent of the total mortality; in 1900 these figures were 14.44 and 10.56 respectively—decreases of 20.7 per cent in proportion to population and of 15.2 per cent in proportion to total mortality.

On the other hand, while the pneumonia death rate had decreased 3.26 per cent in proportion to population it had increased 5.57 per cent of total mortality between 1880 and 1890, and 11.0 per cent in proportion to population and 12.21 per cent of total mortality between 1890 and 1900. The increase began long before there was any influenza in the country.

These computations are made from the data in the summary of vital statistics in the Twelfth Federal Census—that for the census year 1900—and are for the whole United States. Similar computations for Chicago, and covering two additional decades. show more strikingly the great decrease in the general death rate and in the consumption rate, and the much greater increase in the pneumonia rate.

Based on the United States Census figures of population for each year, the following are the death rates per thousand of population: In 1860, 20.73; in 1870, 23.88; in 1880, 20.79; in 1890, 19.87; in 1900, 14.68—a decrease of 29.1 per cent, or nearly one-third in the 1900 death rate from the 1860 rate.

The deaths from consumption per 10,000 of population were in 1860, 25.28; in 1870, 17.68; in 1880. 16.95; in 1890, 17.93, and in 1900 they were 15.30—an aggregate decrease of 39.5 per cent in the forty years.

From pneumonia the deaths per 10,000 of population in 1860 were 4.40; in 1870, 10.24; in 1880, 12.58; in 1890, 18.84; in 1900, 19.78—an aggregate increase of 349.6 per cent of pneumonia as compared with an aggregate decrease of 39.5 per cent of consumption.

Note that the increase of pneumonia between 1880 and 1890—when there had been no influenza in the country, except sporadic cases, for seventeen years, or since the epidemic of 1873—was 49.7 per cent, or from 12.58 in 1880 to 18.84 in 1890; while the increase between 1890 and 1900—the influenza decade—was less than five per cent (4.9), or from 18.84 in 1890 to 19.78 in 1900. It is obvious that influenza. while it undoubtedly has been a potent factor in increasing the mortality rate from other diseases—such as those of the heart, kidneys and respiratory system—is not the sole, nor even the principal, cause of any recent increase of pneumonia.

Since the census year 1900, pneumonia has claimed more than one-eighth of all the victims of the Grisly Reaper in Chicago, one-third more than consumption and 44 per cent more than all the other contagious

and infectious diseases combined, including diphtheria, erysipelas, influenza, measles, puerperal fever, scarlet fever, smallpox, typhoid fever and whooping cough—the total of which deaths was 4,489, as compared with a total of 6,560 deaths from pneumonia.

WHAT MAY BE DONE TO CHECK THIS INCREASING PREPONDERANCE OF PNEUMONIA MORTALITY.

As Chairman of the Section on Hygiene and Sanitary Science at the Fifty-third Annual Meeting (1902) of the American Medical Association, I made a special effort to secure attention to this problem and among those who contributed papers on the subject were Dr. Edward F. Wells, of Chicago, who wrote on the fatality and increasing prevalence of pneumonia, with suggestions for individual and communal prophylaxis, and Dr. James J. Walsh, of New York City, on its incidence, mortality and prophylaxis. The paper read in the same section by Dr. Smith Ely Jelliffe of New York City on Influenza and the Nervous System belongs with these papers—the advice therein given as to the prevention of this disease applying equally well to pneumonia. Dr. N. S. Davis, Jr., of Chicago, also read a paper during the year, before the Illinois State Medical Society, on the treatment of pneumonia, in which was embodied some sound advice on prophylaxis.

From these papers I quote the following: Dr. Wells advises that for individual prophylaxis in a case of pneumonia the nasal, pharyngeal and oral cavities should be kept as free as possible from accumulations of mucus, and when it has been demonstrated that such secretions contain the pneumococcus such efforts should be especially well directed and maintained. In addition, care should be taken not to become chilled when overtired. The individual should, so far as practicable, keep out of the range of the extruded pneumococcus-laden secretions of infected individuals. The sputum and other secretions of respiratory surfaces of pneumonic patients, or of other infected individuals, should be destroyed before they have been allowed to become dry. Such persons should cough and sneeze into a moistened cloth.

He adds "That there may be some comparatively simple means by which pneumonia may be prevented, but that the fundamental information on which prophylactic rules may be formulated is not yet at hand; therefore, it should be the province and duty of public health officers to seek assiduously for such knowledge, and I would suggest that, as a preliminary step in this direction, pneumonia be placed on the list of notifiable diseases and that the environment of pneumonia patients be carefully noted and the results analyzed."

Dr. Walsh, after pointing out the contagious character of the disease, dwells upon dust as a contagion-carrier and urges the prophylaxis of clean streets, points out the danger of infection in crowded assemblies, and of defective house-drainage and gas-leakage as contributing causes. Specifically, as to preventive measures, he says:

"It would seem important, then, first of all to insure precaution against the spread of the disease by teaching the general public that there is always an element of contagion-danger in a pneumonia case, and that certain protective and prophylactic measures are at least eminently advisable in order to avoid all danger. The secretions of pneumonia patients should be thoroughly sterilized by heat or should be subjected

to strong chemical antiseptics. The expectoration of pneumonia reeks with bacilli. It is often received into napkins or handkerchiefs, and must not be allowed to dry and find its way into the air, but must be carefully disposed of by those in attendance on the patient. Practically the same precautions as are now invariably [?] instituted with regard to tuberculosis should be suggested for pneumonia.

"Such directions will doubtless seem exaggeration of caution, not only to the general public, but to most medical men. Let us remember that the profession generally would have been quite as opposed to the suggestion of these precautions with regard to pulmonary tuberculosis twenty-five years ago. Now every one realizes that the old position in the matter was a serious mistake and founded on an erroneous opinion tenaciously held. The same thing may prove to be true of pneumonia."

Under the head of prophylaxis Dr. Davis says that "never have physicians known so much of the nature of pneumonia or used remedial agents more intelligently than now. It is not their fault that the mortality of this disease is increasing. But is the medical profession altogether free from blame for its prevalence? Prophylactic measures have not been enforced as they should have been. It is well known that the cause of pneumonia is a micro-organism in the sputa of those suffering from the disease, and that the malady is engendered by inhaling it. Therefore, the same care should be taken to collect and destroy the sputa that is taken in pulmonary tuberculosis. It is not, however, a sufficient precaution to exercise this care during a patient's brief sickness, because the diplococcus of pneumonia is known sometimes to live and multiply for months and even years, in the mouth, pharynx and nose of those who have had the disease. Therefore, during convalescence, and for at least two or three weeks thereafter, expectoration, if it occurs, should be into a sputa cup containing an antiseptic and water. Moreover, the patient's mouth should be rinsed several times daily with an antiseptic mouth wash. During the illness the greatest pains should be taken to prevent soiling bed clothing, carpets or furniture with the sputa. After the illness the patient's room should be thoroughly cleansed and ventilated. The enforcement of such measures will help to lessen the spread of this disease and will greatly lessen the frequency of its recurrence in those who have had it.

"The facts that house epidemics are not infrequent and that the disease prevails as other contagious and highly infectious ones do in the winter season, when people are most crowded together and live much of the time in badly-ventilated apartments, suggests another prophylactic measure, which the public should be taught to apply, namely, thorough ventilation of houses, offices, factories, theatres, churches, cars and other public places, in order that the air which must be breathed may be kept clean and free from infectious matter.

"Laymen should be taught not to be afraid of a patient who has pneumonia, influenza or tuberculosis, but to be afraid of lack of cleanliness about him during his illness, of failure to enforce prophylactic measures and of close, badly ventilated apartments during the season when these diseases prevail.

"Although experiments with pneumonia serum have shown that a temporary immunity can be created in certain lower animals, it cannot be in man. These experimental successes, however, lead us to hope for more certain means of preventing pneumonia than we now possess."

To these suggestions I would add that every precaution employed in a case of diphtheria should be enforced in a pneumonia case. The two diseases are much more similar from the prophylactic standpoint than are tuberculosis and pneumonia. The former are both acute; therefore, preventive measures are not necessary for so long a period as to become burdensome and perfunctory.

The organism which causes pneumonia may live in the tissues and air passages of human beings for a considerable time without producing the disease. Every person here present has doubtless had the germ in his tissues scores of times, and at this very moment it is in the bronchial tubes of many of us. But before pneumonia can develop in such persons some change must take place, either in the organism or in the individual. At present those of us who are acting as hosts to the germ of pneumonia do not get the disease because there is something in us that, for the time being, renders us immune. That something is to be found in every human body in normal health and vigor. The moment the vitality becomes lowered sufficiently from any of the many causes to which we are liable to become subject—and no one can measure the exact time or place—then the pneumonia organism begins to multiply, to feed upon our substance and to give off a poison, and the result is pneumonia.

It may come to pass that a simple, direct method of preventing pneumonia will be discovered, but until that is done our efforts must be directed towards keeping our bodies in condition to resist and challenge the invasions of pneumonia. Whatever measures are taken to this end will apply with similar force to all other infectious diseases.

The element first in importance in keeping the health up to standard is pure air. Without air no one of us can live an hour, while we may live days without water and weeks without food. An important element in the increasing prevalence of pneumonia is, doubtless, the fact that more persons are spending their lives indoors than formerly—in shops, factories, and offices. Sufficient air is only obtained by living as much as possible, both day and night, in the open air.

The air in dwellings, offices, factories and shops must be kept as pure within as without. If architects and builders cannot secure proper air within buildings, then we must to a greater extent, in the future, do away with buildings altogether.

Next in importance to pure air in dwellings is the necessity for sunlight. No room is fit to sleep in all night that has not been flooded with sunlight all day long. Human beings need the sun and the beneficial effect it has upon the air they breathe quite as much as the vegetable kingdom needs it. The fashion of shades and shutters on windows will be abandoned as the beneficial effects of sunlight are understood.

Less need be said of the necessity for pure water and its constant use both within the body and on its surface, for the world is now becoming awake to this fact.

With reference to food, no general rules can be laid down for all; but it is safe to say that the average adult person in the United States, who lives chiefly indoors, eats very much more than he requires to nourish his body; the extra amount becomes a burden upon his digestive powers, clogs the excretory organs and accounts for most of the malaise, headache and instances of premature breaking down.

While pneumonia may be induced by the bad air, bad heating and bad lighting of dwellings, a more fruitful source of the disease is probably

found in places of public assembly, such as schools, theatres, churches, street cars, etc. Greater attention must be paid in the future to the cleansing, not only of the floors of such places, but of the air. What the American people seem to need is not more and better food, but more and better air. Overwork, overindulgence, excesses, all lower the vitality and render one a fit subject for pneumonia.

As to Dr. Davis' language concerning a pneumonia preventive serum it may be remarked that it is barely ten years since the diphtheria antitoxin for both the prevention and the treatment of diphtheria was produced; that the anti-cholera and bubonic plague inoculations are of still more recent date; and that the scarlet fever and whooping-cough sera are not yet two years old. Let us partake of the optimism of the apostle of bloodless surgery, Dr. Adolph Lorenz, who, in speaking of the probability of a successful serum treatment of cancer recently said in his doctorate address at the Northwestern University:

"If cancer is of parasitic origin, as one must hope, and as many of the most respected surgeons believe, then it may be possible that a curing antitoxin will be found. The prophecy of the great Joseph Lister, spoken as he gave his fellow beings antisepsis, will be appropriate for the second time: 'Surgery will be quite different from what it has been heretofore.'

"If this boon should come to mankind, then general surgery also will give way to a very little sharp but harmless instrument—the hypodermatic syringe.

"May the twentieth century give to the world, burdened with pain and death, this saviour of mankind. The nation which gives birth to this genius will become the first nation of the world through this one deed!"

It is not too much to hope that there is some one here present who may shortly give to the world the still more important boon of an antitoxin for pneumonia.

Meantime, it remains for each of us—physician and sanitarian, curer and preventer alike—each in his appointed place, to do what in him lies to restrict the ravages of this, the most murderous modern scourge of civilized peoples. Let the physician instruct his pneumonia families as to the methods of saving other members of the household from falling victims. Let the sanitarian and the health officer push the propaganda of healthful living, the conservation and development of such inherited powers of vital resistance as the individual may possess—that vital resistance which is, after all, the best prophylactic against, not consumption only nor pneumonia only, but against all the preventable diseases.

The work is not spectacular nor dramatic. It will have no such picturesque phrase as the "Great White Plague" with which to conjure and arouse sentiment and enthusiasm. There will be no imperial monarch to make it a fashionable fad by becoming the president of an anti-pneumonic league, nor will there be any royal palace set aside as a sanatorium for the treatment of pneumonia.

But in the end the persistent public educational work that shall restrict pneumonia will in like measure restrict all other diseases, and so add to the span of human life.

NOTE.—Since this paper was read before the Conference the figures and computations have been revised to conform with the data of Table 1, Census Reports, Volume IV, Part II, Twelfth Census of the United

States. The original figures were taken from the Tenth and Eleventh Census Reports for 1880 and 1890 respectively, and the computations were made on those figures. Sundry discrepancies, noted in reading the paper, led to a comparison of the figures in the three several Census Reports, by which it was revealed that, not only the figures of population but those of total deaths, differ in the various Reports.

For example: The population of the country in 1880 is given as 50,189,209 in the Tenth Census, and in 1890 as 63,069,756 in the Eleventh Census. In Table 1 of the Twelfth Census—above referred to—these figures are changed to 50,155,783 and 62,947,714 respectively. The total deaths are given as 756,893 for 1880 in the Tenth Census and as 732,017 in Table 1 of the Twelfth Census. Similar figures for 1890 are changed from 875,521 in the Eleventh Census to 841,419 in the Twelfth Census, Table 1.

The annual death rates per thousand of population, the ratio between these and the death rates from consumption and from pneumonia, and the percentages of increase and decrease are, of course, affected by these changes. Not, however, unfavorably to the thesis of the paper—to-wit, that while the general death rate and the death rate from consumption have materially decreased during the last thirty years, the death rate from pneumonia had enormously increased during the same period.

Since the Twelfth Census is the latest and, presumably, the least inaccurate as to its statistical data it has been thought well to revise the figures and computations in accordance therewith—the more so as the deduction of 24,876 deaths from the original 1880 figures and of 34,102 from the 1890 figures, inspires the hope that in some future Census the arbitrary addition of upwards of 1.900 deaths to the actual number reported and recorded in the city of Chicago during the Census year 1900 may also be deducted and the true death rate of the city for that period—15.08 per thousand instead of the erroneous Census rate 16.2—may be given.

DISCUSSION.

MR. WELLS: This subject is now open for discussion. I do not believe that there is any subject that this body can consider which is more important than the methods by which this disease, which causes the most deaths in Michigan, can be restricted. In 1901 pneumonia caused about three thousand deaths in this State. I would like to ask Dr. Reynolds whether there is more than one organism that produces pneumonia.

DR. REYNOLDS: It would be idle for me to talk on this subject in these halls of learned men, as I am not skilled in this particular branch of the work. I would suggest that Dr. Novy answer the question.

DR. NOVY: Much the same thing prevails as in the case of diphtheria. There are pneumonias in which various organisms may be present, but the one organism usually found is Fränkel's pneumococcus. Other organisms, however, can produce similar affections; and there are also very commonly mixed infections.

DR. GILBERT: The doctor's paper did not go as far as I hoped it would in that he did not explain to us what would constitute an antiseptic

mode of controlling the disease. I may be excused in confessing that this is a hobby with me. I should have liked to have had some of these scientific men explain in what manner antiseptics act upon these organisms. I resort to antisepsis at every stage of the game, but why I do it is largely empirical. I would like to ask the professors of the Hygienic Laboratory upon what principle these different antiseptics act upon organized bodies in a state of ferment or decomposition,—in other words, what is the rationale of antisepsis. Dr. Baker has said that it is impossible at present to give the chemistry of a disinfecting agent acting upon organized matter. My hobby is the use of sulphur dioxide in the atmosphere at every minute, I believe this is possible and scientific. Sulphur is slowly combustible at 180°. Over a radiator sulphur fumes may be produced all the time. If this is breathed into the lungs of the patient there may be a species of antisepsis going on all the time that is scientific and curative.

MR. WELLS: Dr. Reynolds has pointed out the fact that this disease is spread by means of sputum and nasal discharges from one sick with the disease. Now in restricting the spread of pneumonia, what is the best means for disinfecting or destroying these discharges? It has been shown that tuberculosis is spread in the same way, and the campaign of instruction which has been going on for the purpose of teaching people how those who have the disease may avoid communicating the contagion to others has been quite successful. Is it possible to do this with pneumonia? The course of pneumonia is usually very rapid, and the length of time that this kind of prevention can be used is much shorter than in tuberculosis. Is it possible to restrict the disease in this way? This is the practical question to be considered.

DR. ————: It seems that the deductions relative to the increase in the prevalence of pneumonia are open to a little doubt, because if pneumonia is so contagious now, it was just as contagious twenty years ago. Twenty years ago a case of chronic lung trouble with profuse expectoration was called tuberculosis if the patient died. If the patient recovered it was said that he did not have tuberculosis. At present, however, tubercular cases are recognized earlier, and consequently the death rate for tuberculosis has been lowered and that for pneumonia raised.

DR. VAUGHAN: I would like to say one or two words concerning this interesting and very valuable paper which Dr. Reynolds has read to us. I think that the paper points to facts which must lead us to be more and more enthusiastic about our work. The great decrease in the number of deaths from tuberculosis in spite of the refinements in diagnosis is gratifying. Many cases are diagnosed tuberculosis now which twenty years ago were not so diagnosed, and yet in spite of this tuberculosis has been markedly and rapidly decreasing. It has been just twenty years since Robert Koch discovered the bacillus of tuberculosis, and already tuberculosis as a cause of death is not foremost, or at least, runs a doubtful course with pneumonia. If we go on at the same rate as at present tuberculosis will soon be known only to the student of medical history. It is complimentary to the work that this has been accomplished; and at the same time the paper points out the desirability and the necessity of work in another direction. The question of the infectious nature of pneumonia cannot

be doubted any more than that of tuberculosis. The specific bacillus of pneumonia can be isolated and grown in pure cultures, animals inoculated, and the disease reproduced. As Dr. Novy has said, there may be incidental pneumonias, and mixed infection, but the infectious pneumonia is that of the pneumococcus.

The fact that it is contagious from man to man is demonstrated beyond a doubt. One of the most eminent surgeons in the United States told me that he himself had once accidentally used the same mask for administering an anesthetic on a pneumonia patient and three or four other patients, and all had developed pneumonia. An experiment upon animals would never have been quite as satisfactory as this one accidental and unintentional instance. We must put pneumonia in the list of diseases dangerous to the public health. The sputum in cases of pneumonia must be disinfected the same as in diphtheria and tuberculosis, and the result which will follow will no doubt be marked by a decrease in pneumonia more rapid than that in tuberculosis. The pneumococcus is very susceptible to a large number of chemical disinfectants, and we can very easily burn most of the sputum in cases of pneumonia. I am sure that everyone must be thankful to Dr. Reynolds for coming and reading this most excellent and interesting paper, because it shows what sanitarians have done, and points out another field in which even greater good can be accomplished.

Upon motion made by Dr. Baker, a cordial vote of thanks was tendered to Dr. Reynolds for the able presentation of the subject.

DR. P. J. NOER, Menominee: I have reason to believe that there is an error in our pneumonia statistics. We are a little unfortunate in having one or more forms of pneumonia. We have the pneumococcus, or croupous form, and the broncho-pneumonia, which is also very common. In collecting statistics of pneumonia, has broncho-pneumonia been included or excluded?

DR. REYNOLDS: Most of my figures are from the United States Census. I cannot tell whether they include broncho-pneumonia or not. It is all pneumonia, so far as Chicago goes. We take very great pains to verify certificates of death, when there is any cause of suspicion.

There is in this audience a great desire for specific instructions as to what to do. I would be glad to give them if I knew them, but I do not. We are all feeling our way along these lines very carefully. This is the reason why my paper is the paper that it is. I do not want to go too far, but if I can encourage the men who are guarding the health of the State of Michigan to put forth better efforts along these lines, I will be amply repaid for meeting with you.

What may be done specifically is to teach the profession and the public that the sputum and nasal discharges of all patients suffering with pneumonia must be disinfected. They may be destroyed by chemicals, fire, or they may be put into the sewer.

There is not much doubt about the increasing prevalence of pneumonia. Consumption decreasing so very fast might make the rise of pneumonia look bigger than it otherwise would. I firmly believe, however, that the human race is growing stronger and more vigorous every day, and that the sun rises on a better world every morning.

As the years roll around there are more people living in doors, than forty years ago, in shops, factories, offices, etc. I think there is a tendency to have our houses more compact with less fresh air in them. There was plenty of ventilation in the houses of forty years ago. In this northern climate we have to warm our houses, of course, and this gives rise to irregularities in the temperature of our rooms.

I would like to urge upon every man to launch out and do his best and make a record. There is a great deal that is not known about pneumonia. Each one can keep a record of the occupation of his patients; whether their lives are in doors or out doors; whether they overeat or overdrink or overwork. These are questions of the greatest importance. I want to hear from you and to urge you to greater efforts. We are going to take the stand in Chicago that pneumonia is a disease dangerous to the public health. We may make it a notifiable disease. We have never done this with tuberculosis, because what could we do if we were notified? This work must be done by the medical practitioners of the country.

DR. MCLAUGHLIN, Belleville: I have been much interested in this paper. Two years ago this winter we had almost a scourge of pneumonia. It was a cold, bitter winter, and I attended fifty-eight cases myself. Last winter I had only two cases, one of these being very mild. I would like to ask whether or not the experience of others has not been that the atmospheric changes have a great deal to do with developing the disease. It is my experience that in the cold winters I have had the greatest number of cases of pneumonia. Ninety per cent of my cases, too, have been in the strongest and most robust people among my practice, and it has alse been mostly in those who have exposed themselves to the elements. As to the treatment and antiseptics I do not know much more than our friend from Bay City.

DR. WILBUR: I understand that the cases reported by Dr. Reynolds are from the Censuses of 1880, 1890 and 1900. All of the statistics, I believe, are for broncho- and croupous pneumonia. It was our practice in Michigan to include under the title of pneumonia both croupous and broncho-pneumonia, because, as a matter of fact, it is very difficult to separate them at times. The statistics of pneumonia are not satisfactory because at the beginning physicians did not specify what the form was. The international classification of the causes of death attempts to make the distinction, but it includes, and I think improperly, under the title pneumonia, meaning lobar pneumonia, all cases termed by physicians pneumonia, without specification. All statistics are imperfect because they give space to returns of small numerical importance, and because they do not specify the exact form of the disease. We should have the returns in this form; broncho-pneumonia, lobar pneumonia, and deaths from pneumonia returned by physicians without qualification. There is another title in the international classification, and that is congestion of the lungs. Sometimes this means passive congestion or hypostatic congestion occurring in the course of some chronic disease. Sometimes it means lobar pneumonia. I hope physicians who have to report deaths from pneumonia will specify the kind of pneumonia.

DR. GILBERT, Bay City: While the statistics show a vast increase in pneumonia, I was wondering whether the increase was not apparent

rather than real. In our section of the country croupous pneumonia is rare, while the broncho-pneumonia, or capillary bronchitis, is the common form which we have. This is what gives rise to our large death rate from pneumonia. If this is true all over the country the statistics will not give us much satisfaction.

DR. BAKER: It occurs to me that the statistics are useful for the purpose put before us by Dr. Reynolds, for the reason that there has been no change in the method in the last forty years. The remark of the last gentleman would tend to throw discredit on the statistics. There has been no change in the method of taking the statistics, and, therefore, for comparative purposes the statistics are just as useful as they ever were.

DR. REYNOLDS: There is nothing further for me to say except that I think that the statistics are reliable for comparative purposes. At any rate they are the best thing we have. Dr. Vaughan pointed out that the accuracy in diagnosis adds to the number of cases of tuberculosis which recover without appearing in the statistics, and I think the same would be true in pneumonia.

MR. WELLS: I sincerely hope that this paper and discussion will be a stimulus to the health officers of the State generally, and that they will endeavor to do something to prevent the spread of this disease.

MOSQUITOES AND MALARIA, WITH SOME OBSERVATIONS IN MICHIGAN.

BY GEORGE DOCK, M. D., PROFESSOR OF MEDICINE IN THE UNIVERSITY, ANN ARBOR.

It is hardly five years since Ross first demonstrated the true role of the mosquito in the spread of malaria. Since then a vast amount of work has been done; much has been learned, not only about malaria, but also about mosquitoes; but we are still ignorant of many details, some of them important, and new worlds of knowledge have been discovered that call for explorers. We know that certain mosquitoes belonging to the genus anopheles act as hosts for the malarial parasites. Many species of the genus are known to be capable of serving as hosts, and all the known forms of malarial parasites may grow in a single species. It was thought in an early stage of the investigation that species of culex could act as hosts, but these observations are now considered erroneous. Of the other genera, psorophora has been claimed amenable by Moore, of Galveston, but Dönitz questions the accuracy of the observations. We must remember that only a few species (fourteen of culex out of over one hundred) have been examined, and a great deal of work must be done before we can be sure of the species concerned in malaria. Some idea of the magnitude of the task can be gathered from the fact that more than two hundred well known species of mosquito remain to be investigated, and it is thought there may be as many more not yet named. Since many of the other species are already known to be the occasional hosts of

other important parasites, such as those of yellow fever and filaria, and that others may harbor still other parasites, it is obvious that the task is as inviting as it is extensive and difficult. The question whether malaria is acquired in any other method than that now under consideration is not thought profitable for discussion. Observations are needed, but at present we have none that weaken the mosquito doctrine.

It was supposed very early that the distribution of malaria and anopheles coincided, a view that still seems to be held by some who have not followed the work carefully. It is now known that the belief is far from true, and just as before the mosquito doctrine, so now, the only safe test for the malarial character of a locality is that of exposing human beings in it. Without such a test, we may say nothing but that if anopheles are already present, and especially in considerable numbers, malaria may be there, or if introduced, even in a latent form, it may spread. If anopheles are really absent, according to our present knowledge, malaria can not develop or spread. To put the matter in another way, wherever malaria is endemic there are anopheles, but there may be anopheles without malaria. The mosquitoes may be imported at any time, by rail or ship especially, or they may be supposed, on the ground of imperfect search, to be absent when they are really present. So we can understand the value of accurate knowledge of the mosquito-fauna of any locality.

Coming to a more particular study of the anopheles, we find that this genus, known since 1818, now includes at least fifty species. The identification of many of these is very difficult, so much so that statements as to geographic distribution, infection, etc., are of no value unless positive and based on identification by experts. The assertion so often made as to the total absence of mosquitoes in given localities has been shown over and over again to be erroneous. Still, there are places, like Barbados, where anopheles have not yet been found, though carefully looked for by experienced observers.

Quite recently F. V. Theobald, of the British Museum, the greatest authority on mosquitoes, has proposed a subdivision of anopheles into eight genera, a proposal the fate of which must be followed with interest by all who try to keep abreast with the current medical literature, otherwise a well-known species, under its new name, may seem as novel as stegomyia was for culex fasciata and its congeners, when it was first introduced as a generic term.

The eggs of anopheles are laid in water, usually not entirely stagnant, but protected from strong currents by grass or weeds, or in back water or small bays. They may be laid and develop in standing water, as in holes in rocks, in tubs, cisterns, or casual vessels like tin cans, if these are rained upon at times, or in fountains if playing. In about two days the larvæ are formed, and after about three weeks, during which many larvæ die, they grow into pupæ and in two to four days more, flies or full-grown mosquitoes. The length of the aquatic stage is about thirty days, but may be much less in warm weather. Cold weather inhibits the development, but does not kill the eggs, but different species perhaps vary much in respect to cold. Culex larvæ have been hatched out of water melted from ice in which they were frozen. Larvæ may hibernate beneath the ice in rivers. Drying usually kills eggs and larvæ, though if the drying is not complete life may be preserved, or if the pupal stage is reached, these may mature and flies form. When first developed, males and females are about equal in number, but the males seem not to live

as long as the females, and in natural conditions are much less numerous. They do not seem to hibernate. Mosquitoes of both sexes live on vegetable juices, the male wholly so, though under unusual circumstances males may suck blood. The females suck blood, and this is a very important part of their life history, both for the insect and for the victims. The blood seems to be important, perhaps even essential to the preservation of the species, and during ovulation it seems necessary for the insect to suck blood about every two days, or about as often as eggs are deposited. Eggs may be laid without this, but though some observers hold the eggs so laid are viable, others believe that only on blood diet can perfect eggs be laid. Observation makes it certain that the mosquito does not suck blood for food alone. Among anopheles, especially, it does not fill itself with blood always and fly away. Many observers have noticed that the sucking insect often first ejects fæces and intestinal juice and then blood once or many times, before filling up and leaving her victim. The relation between blood-sucking and fertilization is not peculiar to mosquitoes, but has been noticed in certain ticks, which live abstemiously before fertilization, but after that, bite voraciously. The eggs are laid every few days, to the number of one to two hundred each time. Ficalbi has estimated that in one season in Italy, one female mosquito will give rise to four generations, aggregating two hundred millions of young ones. Kerschbaumer estimates that in Austria, also with four generations, the descendants number thirty-one millions. The idea that mosquitoes, including anopheles, bite only at night, or when the sun is low, is repeated with remarkable frequency, considering that it has often been denied and can easily be tested. They fly most at nightfall, and bite most then, but they are likely to bite at any time, especially in the shade. I have often seen anopheles maculipennis bite in daytime in a shaded but light room in Ann Arbor, and have seen anopheles punctipennis bite savagely on the porch of the Country Club House in the middle of the afternoon. The insect bites most frequently and most persistently in hot weather. The female anopheles, as intimated above, does not die after biting and depositing eggs. She repeats both operations at intervals of a few days. How long the individual flies can live is difficult to say. In captivity they have been kept alive for fifteen days (in warm weather, —in winter very much longer. Bancroft kept a species of culex alive five months). When it was thought that certain species of mosquito always carried malarial parasites it was necessary to suppose the parasites were also able to live somewhere else than in the mosquito and the human body. Other warm or cold-blooded animals, plants and the soil were all considered possible hosts. This idea is abandoned almost entirely because it is not necessary with our present knowledge. All the facts known are against the theory, but it is too early to consider it wholly erroneous.

The mosquito becomes infected by sucking the blood of a human being with malaria in certain stages of the development of the parasites. These stages do not belong to the essential part of the human or asexual cycle of the animal's life, though they are often found in blood recently drawn in cases of malaria. What determines their formation we cannot tell. We know that the sexual forms of the remittent fevers, the crescents, grow in the human being without apparent reference to the other cycle, being present sometimes long after the essentially pathogenic phases disappear. In quartan and tertian fevers the sexual forms are not so

easy to follow up in the blood, and their life history is still partly unknown. We may assume that in some cases the blood contains no sexual forms, but if these are in the blood the sucking mosquito is likely to get some, as it takes up two milligrams of blood, an amount equal to its own weight. A malarial subject can have as many as three hundred parasites per cubic millimeter without symptoms, one with symptoms many thousands, so that the chances of obtaining parasites are good in many cases. Ruge has recently (Centralblatt für Bakt., etc., XXXII Bd. Originale, No. 11, 1902) made a most interesting attempt at counting the sexual forms in the blood of fever patients, and in that way estimating the chances of infection. The work, however, is of such difficulty that much more must be done before we can draw useful conclusions. In the meantime, we have a good deal of experimental evidence showing that not all females, even of amenable species, can be infected, the proportion varying widely, even in insects that sucked repeatedly from infected persons.

The mechanism of sucking deserves a brief consideration, as well as the anatomy of the proboscis. This latter is a very complex organ, made up of seven distinct pieces. Four of them, the mandibles and the first pair of maxillæ, are piercing instruments. When in action the six upper pieces form a tube, through which the blood (or in other cases vegetable juice) is drawn up by the suctorial pharynx. Before this, however, the saliva is ejected through the hypopharynx, one of the parts of the proboscis, which contains a tube of extreme minuteness, continuous with the duct of the salivary gland. So the saliva and the blood do not come in contact in the proboscis, and the difficulty that some have in understanding how the insect can inject its saliva while sucking blood is based on ignorance of the real conditions. In fact, mosquitoes often inject saliva without drawing blood, sometimes making several such punctures without sucking. The primary function of the saliva has been much discussed, but can not yet be satisfactorily explained. It would seem intended not so much to prevent coagulation of the blood as for causing a better flow by bringing on local swelling, such as takes place in many persons when bitten.

The sexual forms of the parasites take on their functions immediately on entering the so-called stomach (the mid-intestine), of the mosquito. According to Ross, whose description I am now following, the male element or male "gametocyte," after breaking through its enclosing corpuscle, throws out the well-known flagella, now called "microgametes," the spermatozoal nature of which was first demonstrated by MacCallum. The female gametocyte forms an ovum, or "macrogamete." Breaking away from the parent cell, the flagella, to use the more familiar term, travel through the liquor sanguinis in the stomach of the mosquito in search of a macrogamete. Finding one, the microgamete enters the cell and unites with its nucleus. This union produces what is known as the "zygote," which now becomes motile and travels towards the wall of the stomach. If the mosquito belongs to a species inhospitable to the parasite, the zygote dies; if the reverse, the zygote penetrates the wall and fastens itself on or just under the outer muscular coat, where it becomes motionless and grows rapidly in size. The number of zygotes varies from a few to a hundred or more. After about a week it may become as much as sixty microns in diameter, or about eight times its original diameter. A capsule forms, and the interior divides into eight to twelve "meres."

Each "mere" finally becomes a spherical "blastophore," bearing on its surface many spindle shaped or filamentous "blasts," and finally, as the zygote reaches maturity, the blastophores disappear, leaving the capsule packed with thousands of blasts. The capsule bursts and the blasts lie in the body cavity. Dried and stained the blasts are twelve to sixteen microns long, with a central nucleus and tapering ends. They are motionless in reagents such as salt solution, but can hardly be so in their natural surroundings, for they soon reach all parts of the host, pierce the capsule of the salivary glands, enter the salivary cells, and finally the duct. From there they pass through the middle stylet, tongue or hypopharynx into the tissues and blood of the host bitten by the mosquito, and, entering red blood corpuscles, begin the asexual cycle. It is hardly possible that mosquitoes can cause infection by direct transfer of blood from person to person. Numerous experiments with hypodermic needles, from the time of Gerhardt's early successful experiment, show that this is possible with even small quantities of blood, but the amount that might adhere to the mosquito's proboscis seems too small. All the steps of these complicated operations have actually been seen and preparations of all stages have been widely demonstrated. A beautiful demonstration was made by Manson at the meeting of the British Medical Association in 1901, which the writer was fortunate enough to see.

As remarked above, not every individual among amenable species can be readily infected experimentally, the failures being probably due, according to Ross, to peculiarities in the steps of the experiment or of fertilization. An infected mosquito can infect only a limited number of people. Besides warm-blooded animals, mosquitoes suck the blood of others, such as turtles, fish, the chrysalides of butterflies, small diptera, cicada and its pupa, etc. These habits may be of great epidemiologic importance, for if there are as yet unknown stages of the malarial parasite they may live in such animals. It is pretty well established that the malarial parasites are not transmitted to the eggs, as was supposed at one time.

At present one can only speculate as to the primary origin of the parasite in man and mosquitoes. Sambon suggests that these are specialized parasites like pediculus capitis, tænia saginata, etc. Though they must have originated in other forms, those now found in man probably developed, according to the same author, from earlier species already parasitic in other hosts, such as birds and bats, that nest under our roofs; and the parasites transmitted to man by the mosquitoes that, like the cockroach and housefly, have associated themselves with man. The disappearance of malaria from certain localities where mosquitoes and other factors seem favorable, might be connected, as Sambon says, with the extinction of some animal or plant that may have been a necessary link in the life history. Theobald suggests that the disappearance of ague from England may have been due to the fact that anopheles maculipennis has lost the habit of blood-sucking. But, aside from the question as to the complete loss of that habit, the disappearance of the disease in many other localities, as notably in Michigan, where anopheles maculipennis still sucks blood, and where it is hardly possible the other factors have been eliminated, is more likely to be due to the former widespread use of quinine, as Christopher has suggested for other places.

An important factor in the mosquito stage of the parasite's growth is temperature. The cycle goes on best at about 25° to 30° C., (77° to

86° F.), and is then about fourteen days in duration. It can go on at an average temperature of 18° C. (64° F.), or with variations between 10° C. and 25° C. (50° F. and 77° F.). With the lower temperature the development is slower. The reappearance of spring infections,—not relapses,—can be explained by the revival of hybernating mosquitoes in the warm days, for the seasonal occurrence makes it unlikely such attacks are due to insects warmed sufficiently in houses. Still, the latter possibility can hardly be denied.

With this introduction, my observations on mosquitoes will doubtless seem less irrelevant than otherwise. I have for years made desultory notes on the insects here, but the rarity of malaria and the relative scarcity of mosquitoes prevented me from making systematic observations. When the soldiers returned from the South in 1898, with the possibility of setting up new foci of infection, I paid more attention to the matter. I found that anopheles maculipennis (often called a. claviger, or a. quadrimaculatus) could be found in scanty numbers in houses all the year round. This is one of the commonest mosquitoes of Europe and America, and the one on which Grassi, Bignami, and Bastianelli made their convincing observations on the life cycle of the malarial parasite. In the fall of 1901 Dr. Cowie and I found these, sometimes with culex, in five houses occupied by malarial patients observed and reported (but not published), by Dr. N. A. Gates of Dexter. In this small epidemic the source could not be found. Much work had been done on the railroad in the vicinity, but we could not determine as to malaria in the construction gang. Our visit was made after a very cold change in the weather, and we found no larvæ near the railroad, along the river, or around the houses, and no mosquitoes in the well screened boarding cars.

The summer of 1902 (as you are all aware), was remarkable no less for its weather than for the unusual development of mosquitoes. Even in the closely built up parts of the city the insects were so numerous as to make an evening out of doors a most painful experience. Much building, the tearing up of streets and changing of grades, with unusually frequent rains, formed innumerable breeding places for the pests. I spent a great deal of time from the opening of spring, searching the most promising places for larvæ, but it was not until warm weather that these were numerous. This was doubtless due to the fact that the previous season was not a good one for mosquitoes; next spring should be much more favorable for finding larvæ, immediately after the ice melts.

The places examined most carefully were the shores of the Huron river from Foster's to Geddes, but getting as far on both sides of town as Dexter on the west (nine miles) and Ypsilanti on the east (eight miles); the valleys and ravines running back from the river valley; the banks and low places and swamps along Allen's creek, as it runs through the city; and various depressions where water stood more or less all summer. I also examined many houses and yards in various parts of the city and vicinity in various directions. By carrying a killing bottle, some small vials and pill boxes and a lens, I was always ready for the flies. On the search for larvæ I added a white dipper to my outfit.

Culex larvæ were found in almost every place where water stood, as in the ditches along certain streets, in low places everywhere, and often in the backwater of running streams. In general, anopheles larvæ do not grow in company with culex, being devoured by the latter, but with food in plenty, as it was in many places I examined, the two often live

together. In the vicinity of larvæ breeding places culex flies were numerous, especially about sundown. I made no attempt at counting, or even capturing these, except in each place to determine the species. In all cases this was c. fatigans (or pungens), the commonest of all mosquitoes. They could easily be caught even in midday, by sitting in the shade. In a few mintues the flies would settle and were often so tame the palps and wings could be examined with a lens.

For a long time after the plague began I found no anopheles. On August 2d I found the first, a female anopheles punctipennis, on the porch of the Washtenaw County Club House, about 6:00 p. m. Next day I found two more of the same species in the same place. I had frequently examined the house, barn and woods for flies, and the brook for larvæ, of this genus, without result. The brook is probably too swift in most parts, and too often disturbed in others, for the larvæ. After they began to appear, one or two specimens could nearly always be found, but the great majority of mosquitoes found in the grounds of the County Club were culex. I found that these settled in enormous numbers on the sheep grazing on the field. They did not seem to bite the animals in the day time, nor would they readily leave the sheep to settle on people close to them. Perhaps the warmth of the animals' bodies attracted the flies. As in former years, anopheles, both maculipennis and punctipennis appeared in my house from time to time this summer, the last one being seen in the middle of November. I found them only inside the house, usually in the same room, a dark one without water, but next to the kitchen, to which they had easy access, especially at night and in the early morning. The house is screened, but the doors are often left open, and the insects could readily enter. Owing to the exposed situation of the house, at the end of a bluff, mosquitoes were not as numerous as about more sheltered houses, but in the worst part of the season culex flies could be found around the house, as around all the neighboring ones. I was never able to discover the breeding places of the anopheles, but cannot help thinking they were on the hill on the north side of the bluff, among small marshy holes and high grass, where larvæ are hard to capture, even if present.

In July and August a good many anopheles, mostly punctipennis, were found in the Zoölogical Laboratory, as I was shown by Professor H. B. Ward. Other places that I examined were free, but Professor Bigelow found in his house, on November 22, a female punctipennis, and a male culex.

On account of the interesting finding of culex larvæ frozen in pitcher plants by Breakeley and Smith, of New Jersey, I examined many leaves of these plants growing about one of the small lakes west of town, but could never find larvæ, eggs or other mosquito parts in the leaves. On December 7, 1902, I collected eight large leaves with ice in them. On melting the ice, I got many insects, mostly small beetles, whole and in part, but no larvæ, and none hatched out in a warm room in which the water was kept and partly changed for several days.

I take pleasure in expressing here my thanks to Dr. L. O. Howard, of Washington, who kindly confirmed my diagnosis of the species maculipennis and punctipennis. Without such authoritative determination, I should not have felt justified in making this report.

Since anopheles exist in this locality and suck blood, malaria can develop. In order to form an idea of the degree of danger we must

consider not only the existence of the proper kind of mosquitoes, but also their number and the possibility of obtaining parasites from human carriers. With reference to number, there is comparatively little recorded in exact figures in other places. With the greatest persistence I could rarely find half a dozen anopheles in a single expedition. Grassi, in a carriage ride of two hours in a malarial part of Italy, captured two hundred. In a malarial locality on the Susquehanna river, Bashore found that from twenty-five to seventy-four per cent of mosquitoes were anopheles, during the malarial season. After frost, with little intermittent fever, he found sixteen per cent. From such comparisons, it is clear that malarial carriers are relatively few here. This goes far to explain why it is that the soldiers returning from Cuba or the South, as well as occasional students with latent or active malaria, are not more dangerous as foci of disease.

My observations on malaria in Ann Arbor have been on relapses in imported cases, with one exception. When I first came here many cases in the city and vicinity were diagnosed malaria, but all that I examined were negative. For several years this diagnosis has been less frequently made. After 1898 I made special efforts to hear of cases developing here and in other parts of Michigan, but so far have not heard of definite cases. Some of my correspondents have not yet answered, however, and if anyone has such observations, they would seem well worth publishing. The only case of local malaria known to me is the following: E. H., 18 years, was admitted to the hospital August 27, 1901, for gonorrhœal arthritis (shoulder and knee). The blood examination showed 4,900,000 red corpuscles, 9,676 leucocytes, and hæmoglobin 75 to 80%. No special examination was made for malarial parasites, as the malarial history was not considered at that time. September 20, after the patient had been in bed for twenty-four days, he had a chill at 2:30 p. m. Before the chill the temperature, which had ranged about 98.4° to 100° or 101° for three weeks, rose to 102° +. After the chill it reached 104.4°, and then fell to normal at 5:00 a. m. next day, with slight sweating in the decline. Tertian parasites were found in blood examined during the chill, in a single generation. A few parasites were found the next morning, but these disappeared. No medicine was given for the paroxysm. The temperature ran between 98° and 99.5° until September 27, at 8:00 a. m., when it was 1° higher than at any time since the chill. At 11:00 segmenting parasites were found in the blood. At 12:00 the temperature reached 101.1° and then fell. No parasites were found after this.

The patient had lived in N. Main street near the mill dam for three years; before that four miles northeast of town. He first had ague in 1900, while working in a printing office. He had not been in the country or on the river. There were five tertian paroxysms, with a relapse two or three weeks later. In July, 1901, he had a chill and then no more until the one observed in the hospital. He said there had been mosquitoes in his house, but Dr. Cowie, on examining the house after the chill was noted, found none. The four other people in the house had not had malaria, and the patient did not know of exposure to another case.

The history is interesting and instructive in other ways than as proving a genuine autochthonous malaria. The short duration of the paroxysms is unusual for the time of year. The chief importance of the case in a clinical way is the emphasis it throws on the need of blood examinations in all possible cases of malaria, even in unlikely localities. With the

gonorrhœa history and the repeated punctures made into the patient's joints, one might have suspected a septic paroxysm. A very brief examination showed a different cause.

In this connection a recent case simulating malaria is interesting. A few of these come under my observation every year. In the latest case the patient had a continued fever of short duration, ending by lysis. It seemed possibly typhoid. On the second day after the temperature reached normal, it rose again with a chill to 103.4°, and on the following days to 104.6°, 105.6°, and 106.8°. The chill was severe, the rise of temperature rapid, the fall also rapid, to 98°, or below. After nine days in the way described, the temperature followed a remittent course for a few days, but again became intermittent and several times reached 107°. The single paroxysms closely simulated malarial attacks, but the time of acme varied rather more than in malaria, those of the first four days being respectively 9:00 a. m., 3:00 p. m., 2:00 p. m., 7:00 p. m., the chills, 6:00 a. m., 2:00 p. m., 10:00 a. m., and 4:00 p. m. There was no obvious septic focus, but there was an old heart lesion, and this, with the peculiarities of the course, and a leucocytosis of 35,000, suggested sepsis as more likely than malaria. Examination of the blood showed an absence of parasites, and, along with the leucocytosis, led to an early diagnosis of sepsis. The fatal end was therefore not as unexpected as it would have been under the alternative diagnosis.

THE LOCAL SLAUGHTER-HOUSE AND MEAT INSPECTION.

BY REV. CAROLINE BARTLETT CRANE, KALAMAZOO.

In the fall of 1901 I was appointed by the Michigan State Federation of Women's Clubs, chairman of the committee on Household Economics, and as part of my duty I prepared for the use of the clubs in the State a little manual called "Studies in Housekeeping," which included the following topic: "A Petition from the Kitchen to the City Council: For the Official Inspection of Meat, Milk and Food Products."

During the club season of 1901-2 I personally conducted the Twentieth Century Club of Kalamazoo through this course of study, and when the date for the consideration of meat and milk inspection appeared but a month or so ahead, I endeavored to secure expert treatment of this important subject.

I invited three State officials in succession, each of whom evidently would have been glad to oblige me but for important official duties which stood in the way. They sent me, however, letters of encouragement and approval. Then I invited three Kalamazoo physicians, the last of whom, after much persuasion, consented to speak upon dairy and milk inspection. The meat of the matter not being disposed of, it seemed necessary for me to assume this task, in spite of a layman's lack of qualification.

Where to begin? Where did our meat come from, anyway? I had long had a vague idea that here was a matter which needed looking into. But there are so many things that need looking into, and this one so particularly uninviting! My thoughts reverted to certain old, dilapidated

structures standing paintless and forlorn upon the edge of sluggish streams. On country drives of summer evenings who has not been made aware of these establishments, so unobtrusive to the sight, so insistent upon the olfactories, where is carried on a gruesome business which our human constitution seems to require, but which we wish to think as little as possible about? Nobody but small boys, I supposed, ever had the courage—or the stomach—to peer into these grizzly precincts; and now it seemed necessary that I should visit them myself. On March 21 of last spring, having secured information of the number and the exact location of these slaughter-houses which encircle the city of Kalamazoo, I proceeded immediately upon a tour of inspection which covered six of the seven places in a day and a half, before any of the proprietors got wind of our intentions. The seventh place we also visited, but found it closed and locked, so that a second visit was necessary, after the proprietor had learned of our previous attempt.

I was accompanied on these visits by two men and two women, one the wife of our mayor at that time, Judge Alfred J. Mills; the other the wife of a former mayor, the Hon. Otto Ihling.

We did not start upon our rounds "expecting to find a parlor," as the proprietor of one of these places afterwards sneeringly remarked to a newspaper reporter. We did start out pledged to make no comments and to show no surprise at anything we might witness; and we were kept speechless, not so much by resolve, as by the unspeakableness of the state of things which everywhere was revealed to us.

Since this state of things proved to be news to our mayor and city council (which, ex-officio, constitute our local board of health) as well; since I never found any one who professed to be aware of the condition of things, and since, from a large correspondence following with health officers and other officials, State and national, all over the country, I am persuaded that the condition of things about Kalamazoo is not exceptional, but, rather, typical,—I will attempt to briefly describe to you what I found; and I trust you will believe that this is no hysterical version, but a simple and restrained account of facts.

These seven slaughter-houses are all situated within one mile of the city limits of Kalamazoo, upon or near frequented roads. Not one of the seven buildings or premises has anything whatever in point of construction, arrangement, or care, to redeem it from utter condemnation. Entirely without provision for drainage of either house or ground, the earth beneath and around is soaked with the rotted blood and filth of many years. The pens and sheds containing the animals to be slaughtered are, for the most part, apparently bottomless pits of mud and filth into which the half-devoured, uncooked offal is trampled, while squealing pigs carry on, literally, an intestine warfare; presenting, when it is remembered that these same swine are destined shortly to be eaten by ourselves, a sight as revolting as human imagination could picture. In one pen we saw trampled into the mud the decomposing body of a very small calf, quite too young, I think, to have been born, and inevitably suggesting the previous slaughter of a pregnant animal.

As to the buildings themselves, they are nearly all old, abandoned barns or sheds, unpainted, weather-beaten, warped, decaying; and they are, without one exception, filthy to an unspeakable and an unimaginable degree. Dense black cobwebs drape the open lofts and upper walls; but when one gets down to within six or seven feet of the floor, nothing less

than a hoe and plane long and conscientiously applied could remove from walls, floors, posts and shelves the caked blood, grime, grease, hair, mould and other quite unmentionable filth which covers every inch of every exposed surface, and which, in many large areas, was actually more than an inch thick. The cooling rooms—foul-smelling as the rest—showed somewhat less of blood and chunks of putrid flesh on the walls, but more of green mould and slime. In none of these places did we find evidence of even the floors having been washed with even cold water. The place last visited—the one, by the way, which is reputed to furnish as many carcasses as all the rest together—was the only one in which they claimed to have a hose or any means of flushing floors,—a broom and pail being the extent of cleansing paraphernalia apparent in the others. As this floor gave no evidence of ever being flushed, I questioned particularly, only to receive repeated assurance that they did use a hose. After leaving the building, I mustered courage of my convictions to return and say: "If you don't mind, sir, I'd like very much to see that hose." And the man replied, after some hesitation, that it was "over at the house." I will say, however, to be just, that a disinterested person has since assured me of having seen a hose on the floor of that place; but he more than doubted its habitual use.

In some of the places, the floor appeared to have been roughly scraped, as with a hoe; in others, dirt could have been shoveled out on Saturday afternoon, when the last slaughtering had been done Friday; and in one place the animal had evidently been stabled over night, which now lay, deprived of its skin, on that filthy floor.

Rats, those fell distributers of slaughter-house disease to neighboring farms, were in evidence everywhere. I regret now that I did not procure some of them for examination for the presence of trichinæ. But at the time of my visit I had omitted the appointment of an official rat catcher, and after my objection to the condition of things became public, I naturally could find no opportunity for making rat reprisals against the enemy.

As to the manner of slaughtering and dressing animals, it is no wise better than one would infer from the surroundings. In the last place visited—the largest one, which kept the hose over at the house,—the beeves awaiting slaughter are confined in a filthy shed, only separated from the slaughter-room by one thickness of ill-fitting boards, through which it is to be presumed they witness, trembling, the fate of those which precede them. The man in charge told me that they had to be dragged in by the head, because "they seem to be afraid." Surely, here is something which concerns the Humane Society.

After knocking in the head and bleeding (which painful spectacle we avoided in every place visited), the animals were skinned by a big, burly, sweaty negro, who ever and anon wiped the grease from his knife on the manure covered flanks of the cow, and when he was not using his knife held it by the blade in his mouth. After skinning, the viscera were removed by a white man who threw parts of them, including the liver and heart, on the floor, and slapped the delicate sweetbreads on to a rusty hook against the filth crusted wall.

By a shelf in one corner, a boy—whom we so regretted to see in this place—was cutting up the viscera and throwing that part designed for human consumption onto the floor under the shelf, while from time to time he opened a door into the offal pen and hurled handfuls of intestines

over the heads of the hogs that stood with expectant snouts ranged at the threshold. A pail of water stood on the floor, and the white man, the boy, and the negro came from time to time to wash their hands and knives in it. When a beef had been eviscerated and hung up, the butcher, before splitting it, dipped a piece of an old gunny sack into this same pail of same water and zealously, as for our approval, scrubbed dirt into the naturally clean interior of the cow.

In every place I examined the knives, saws and cleavers. They were always found stuck into or hanging flat against the crusted walls. They were invariably filthy, with blood, grime and hair thickly bedded about the half. It is perhaps needless to add that the hands and clothing of the butchers were as filthy as their filthy methods and surroundings.

Now I well know that, revolting as this all is, the dangers to the public health from filthy ways of butchering are hardly comparable to the dangers from meat which is itself diseased. Concerning that, however, you know a good deal more than I do; and hence I wish only to remark that, by the method which now obtains in Kalamazoo, and, as I understand it, in almost all the cities and villages of our State and in other states as well, there is nothing—not even the necessity of taking out a butcher's license—to prevent any kind of a man from killing any kind of a beast in any kind of a place, and selling it to any local dealer who may, or may not, be aware if that animal came to the slaughter-house diseased, dying, or dead.

After my horrifying experience in Kalamazoo, I went to visit the great abattoirs under government inspection in Chicago, and found how this same work could be done decently, cleanlily and with proper sanitary safeguards. And Dr. Dyson, Chief of the Chicago Bureau of U. S. Inspectors, told me that, after a butcher had killed and dressed a tuberculous cow or hog, taken out the viscera and peeled away all the tubercular deposits, he would defy a meat dealer or anybody else to detect a tuberculous carcass. The disease in hogs, he told me, is often confined to the glands of the neck, and may not show in the intestines or peritoneum. Hence, in the great packing houses under government inspection, an inspector stands always at the head of the splitting alley, to examine the neck glands. Even if Dr. Koch's theory of the non-communicability of bovine tuberculosis to man be proved, yet we will hardly wish to eat the flesh, and the toxins elaborated in the system, of a germ-diseased animal. As to the numerous other diseases which may be communicated to man through the eating of diseased meat, I read, during the acute period of my investigations, a section on the subject in the latest edition of Osler's Practice of Medicine; also Prof. Salmon's articles upon "The Relation of Bovine Tuberculosis to the Public Health," and upon "The Inspection of Meats for Animal Parasites;" also, Prof. Stiles' government report on "The Country Slaughter-house as a Factor in the Spread of Disease,"—which literature has filled me with a proper and permanent horror of uninspected meats.

Now, as to what has been done, and may be done in Michigan. Wishing to avail myself of the help of the State Department of Health, I wrote to your secretary, Dr. Baker, asking for suggestions and literature upon the subject of slaughter-houses and meat inspection. Along with a very kind and helpful letter, Dr. Baker sent to me a number of documents, one of which was a paper by Dr. Homer O. Hitchcock, for many years a valued member of the Michigan Board of Health from my own town.

This paper was called, "A Report on Slaughter-houses, Rendering Establishments, Etc.," and it was published by the State Board of Health in 1879. In this report, Dr. Hitchcock published the results of a correspondence with the health officers of some forty or fifty towns in Michigan. From this report it would seem that precisely the same condition of things obtained in these towns twenty-four years ago as obtains now in Kalamazoo, and (as I cannot doubt from information gathered from widely separated sources) as obtains generally over the country, in all but a very few cities. Why no State legislation or general local regulation resulted from Dr. Hitchcock's effort, I do not know; but I well know in a general way how difficult it is to move people to do things for their own good.

I am not familiar with the history of other efforts made by the State Board of Health; but you, gentlemen, doubtless are. I do know that two years ago this Board endeavored unsuccessfully to secure at Lansing the passage of a bill providing for inspection of meats, and I do not wish to propose anything which will embarrass efforts already on foot.

I am thankful, however, for the opportunity to present this matter before the Board of Health and the health officers of the State here assembled, and earnestly hope that through your leadership some real reform can be speedily effected by either State or local regulation.

When this matter was presented to the city council of Kalamazoo they were aghast, and invited me to co-operate with the health officer and the city attorney in drawing up such an ordinance as seemed desirable. We quickly found, however, that, in the opinion of our legal advisers, our charter from the State would not admit of our requiring the segregation and official supervision of slaughter-houses outside the city limits, on pain of their owners being prohibited the markets of the city,—a measure which I believe to be vital to this business. But we hope to get at Lansing the needed amendment to our charter, and see what can be done then at home.

However, it seems most desirable that the State should grant, not to a few communities, but to all—every city, village and township—a general permission to prohibit the sale within its precincts of meat which does not bear the stamp of either a government or a local inspector. To this end there should be a local inspector (with assistants if needed), stationed at one central abattoir owned, or at least managed, by the city, where all animals must be inspected before, during, and after killing, to the ends of decency and health.

This, it seems to me, is clearly within our constitutional rights. The United States government does not require the inspection of meats. It simply says: "You cannot do an inter-state or international business unless you have your meats inspected; and we furnish the inspectors if you request it."

So, is it not competent for a city, village or township to say: "If your slaughter-house is within our corporate limits we propose to regulate it and its products. If it is outside, do as you please; *but* if you are to sell meat in our city we must first be assured that it is wholesome and decent meat; and the only practical way in which to manage this matter is to have a central abattoir and official inspection which we will furnish for a reasonable fee, if you wish."

We have now in Kalamazoo, by virtue of our charter, exactly such powers of supervision over country dairies and their products (though power is not exercised); and consequently we have at present no pro-

tection but the necessarily few and hasty visits of the Pure Food Commission, which does the best it can (with its inadequate appropriation and small force of workers), and knows how very far this best is from what it should be. The Pure Food Commission does not attempt any supervision of our slaughter-houses, nor can we ask that it should under the circumstances of difficulty which beset the work now expected of this commission.

I believe that local vigilance, backed by adequate power from the State, is the price of liberty from all such evils as I have sought in this paper to describe; and surely the State which takes the pains to forbid red gauze over peach baskets might do something to afford protection from such ghastly wrongs as fall upon innocent consumers from the uninspected slaughter-house and dairy.

DISCUSSION.

MR. WELLS: This is an extremely careful description that we have listened to, and I presume that many of you are in the same situation that I am; that is, that it is a complete surprise to you. I have not had a very high opinion of these establishments in our towns and villages, but this paper is quite a revelation. I trust that the matter will be discussed, and that the method pointed out by Mrs. Crane, or some other method, will be acted upon. It seems to me that it is a very proper subject for legislation. I understood that there was no law by which cities could control the matter. Did I get this correctly?

MRS. CRANE: In our own city it was found out by the mayor and the city attorney that it was not competent for us to legislate in regard to the slaughter-houses outside of the city limits unless the city charter gives specific right to do so. Our charter does give this privilege in regard to dairies, but does not so specify as to meat. I am hoping that there will be no difficulty at this session in obtaining this privilege.

DR. REYNOLDS: This is a most valuable paper, which I hope will be published and given the widest circulation. I believe that in these matters we need education rather than legislation. Mrs. Crane has done a very valuable work along this line. I believe that the Humane Society could control the conditions described in those pens. When I lived in the State of Michigan I did not know much about these things. In Chicago the slaughter-houses are on a pretty good basis, although it is still a struggle to keep the pens properly sewered and bricked. It requires constant vigilance to keep these pens right. There is always a certain number of impecunious dealers who will sell anything in the way of meat if they can. We have so much inspection now that the large packers do not attempt to do anything of this kind. They want to keep the reputation of their goods at the highest notch. Personally I feel very much indebted to Mrs. Crane for this paper.

DR. TURNER: I believe we can approach this matter by requiring every butcher to take out a license. It would be a good thing if we had a State law to this effect.

On motion of Dr. Baker the subject was referred to the committee on legislation for their consideration and report.

HYDROPHOBIA,—RABIES, ITS RESTRICTION AND PREVENTION.

BY F. G. NOVY, PROFESSOR OF BACTERIOLOGY IN THE UNIVERSITY, ANN ARBOR.

During the past two years we have had in the neighborhood of Ann Arbor and Ypsilanti thirteen cases of rabies. Of these, eight were in cattle, two in dogs, and one each in man, the horse and the cat. During the past three months we have received material from different parts of of the State, and several of these specimens were found to be from rabid animals. It is evident that hydrophobia is not an uncommon disease, nor is it in any sense a myth, as was commonly believed a few years ago. Hydrophobia is a very definite thing, due to a very definite cause, and results just as sure as any disease can result whenever the cause is introduced into the body. If we were to define rabies, we would say that it is an acute infectious disease which affects the brain, spinal cord and nerves, and is, therefore, essentially a disease of the nervous system. It is due to inoculation with the saliva of a rabid animal. The dog is the most important animal in this respect. Fully ninety per cent of cases of rabies in man and animals are due to dogs. In some places there may be local conditions where some other animal for the time being will be the chief cause, but taking cases as they come, we will find that fully ninety per cent of them are due to inoculation with the saliva of rabid dogs.

The next most important animal in this respect is the cat. The cat is responsible for from five to eight per cent of cases of rabies. Of the other animals, and there are a great variety, the horse, cattle, wolf, fox, etc., make up the remaining one per cent, or thereabouts. In a locality where wolves are very common, as in Russia, we would expect that the wolf would be an important factor. In European countries it is the cat and dog that are primarily the carriers of the disease.

It is well to note in this connection that all mammals are subject to rabies. Man, dog, cat, goat, sheep, cattle, hogs, deer, etc., are all subject to the disease. Experimentally in the laboratory we make use of guinea-pigs and rabbits, occasionally monkeys. Thus we see that so far as mammals are concerned, they are all subject to inoculation, either naturally or experimentally. While old pigeons are immune, the young ones are susceptible, as also are chickens, geese, ducks and owls.

The saliva, which is the means whereby the animal confers the disease upon another, may be introduced, and usually is introduced, through the bite of the animal. Exceptionally the saliva may come in contact with an abrased surface. For instance, a cow or horse need not bite, but the saliva from such animals may come in contact with an abrased surface and rabies may thus result. In either case, whether planted directly or accidentally brought in contact with a wound, the disease is likely to develop. So far as we know there is never a case of spontaneous rabies. It is a fairly common idea, perhaps, that dogs develop the disease spontaneously. The lack of water during the hot season is a favorite idea with some. In summer time the animal often suffers with thirst, but thirst alone will not cause the development of rabies. Others, again,

believe that the confinement of the animal may bring it about. The fact is that no one has yet been able to demonstrate a single case of spontaneous rabies. Invariably, whether the disease occurs in man or animals, the history of the case will show that there has been a rabid animal about, and that the disease is planted by a diseased animal into others.

The transmission then from animal to animal is necessary to the maintenance of the disease. The cause of the disease, whatever it may be, dies out very easily outside of the body. In fact, it is one of the most easily destroyed causes, and we cannot conceive of its living in the soil, for example, as we can easily conceive to be the case with cholera and typhoid germs. The virus of hydrophobia does not and cannot live in nature. It is easily destroyed by air, and by desiccation.

The disease prevails in all countries, in all climates, and in all seasons of the year. People very often get the idea that rabies is a disease of the hot months, and that it does not occur in winter. This is a very fallacious idea. Statistics have been gathered which show conclusively that in some countries the disease is even more frequent in winter than in summer. On the whole, however, there is a slight increase in the summer months, although it is usually as common in January as in July and August. The reason for the slight increase in the disease in the summer months may be found in the outdoor life that men and animals lead during these months.

Ordinarily we meet with only sporadic cases, but at times where the conditions are favorable, veritable epidemics of hydrophobia have broken out, and it is this matter that requires the careful attention of those who are concerned in the preservation of the public health. One dog may bite a dozen animals and these in turn may serve as spreaders.

I do not want to give the impression, however, that the bite of a rabid animal is always dangerous, or that every animal bitten by a mad dog must come down with rabies. This is far from being the case. It is the exception. In general, we can say that only one-third or one-fourth of all the animals bitten by mad animals contract the disease. Statistics show that in man only about twenty per cent develop the disease as a result of the bites of rabid animals. It is by no means the case that every person who has been bitten is bound to contract the disease.

Why is it that every one bitten does not contract the disease? There are several reasons for this. In the first place the susceptibility of the individual is to be considered. Some are very susceptible, others less so. But more important than this is the location and character of the wound which is produced by the animal. It has been recognized from the earliest times that bites on the face, neck and hands are more dangerous and produce fatal results more rapidly than do bites on other parts of the body, and the reason, largely, is that the other parts of the body are protected more or less by the clothing. Obviously, if the wound is a slight surface one it is less liable to be followed by the disease than when it is deep. Again, the clothing can be looked upon as a means of filtering the saliva of the rabid animal. A good deal of the saliva is held back as the teeth of the animal pierce the clothing. We know from actual experimental work that if we take the brain of an animal that has rabies and dilute it say with ten thousand parts of water we can inject this material in this dilution and not produce rabies. In a dilution of 1 to 200 or 1 to 500 it will cause the disease. In this experimental fact lies

the explanation of why bites, especially through the clothing, do not necessarily produce the disease. The saliva is filtered and held back on the outside. A small amount, perhaps one ten thousandth of the virus, may get into the wound, but this is not enough to cause the disease. Please understand that the figures given refer to large statistics. If, in a given outbreak, the rabid animal bites half a dozen people, all or nearly all may die as the result of very severe infection, but such instances are very rare.

I have already indicated that rabies is a nerve affection. The rabic saliva must come into contact with a nerve in order that it can produce its result. If the bite of an animal does not penetrate and lacerate nerve tissue, we can easily understand why the disease will not manifest itself. It is largely on this account that bites on the face and hands are particularly dangerous, because of the abundance of nerve endings and the absence of the protection afforded by clothing.

A very striking feature of the disease, one which renders it unlike anything else we have, is the long period of incubation. In the ordinary bacterial diseases this period is usually two or three days, or perhaps a week, before the disease manifests itself, but in the case of rabies, things are quite different. The period of incubation is subject to extreme variation. In man perhaps the shortest period has been thirteen days. The exceptionally early period is twenty days. The ordinary period is about five or six weeks, or, we will say, within sixty days. The exceptionally long period is well established, though not all statements on this point should be accepted. There are those who believe that the bites of rabid animals may produce the disease years after the accident. We may well question such statements, and yet we do know quite definitely as the result of actual observation that it is possible for the disease to make its appearance after six months, eight months, ten months, and even fourteen months after the injury. In two or three cases where the individuals were bitten and were subsequently treated in Pasteur Institutes they are known to have developed the disease after an unusually long interval. One case of this kind came down twenty-two months after the infection, and another in twenty-seven months. Thus, we see that the period of incubation varies within wide limits, and that it is usually not less than three weeks, commonly five or six weeks.

When once developed, the disease usually kills in two or three days, exceptionally it may last a week. In man we may say the disease is invariably fatal. No one yet, I take it, has met with a single case of rabies in man where the individual has recovered after the disease has appeared. In dogs and experimental animals we know that the disease is not always fatal. Four per cent of inoculated dogs in the Pasteur Institute at Paris recovered spontaneously without any treatment whatsoever. This is the exception, of course.

So far as the disease itself is concerned, it usually presents itself in one of two forms. There may be an excited stage. In some animals this feature is almost constantly present, while in others it is not. For example, in dogs the excitement stage, or furious condition, develops in about eighty per cent. They are then said to be rabid, mad, or furious in their behavior. On the other hand, in the case of rabbits, the furious condition is the exception. If it develops at all it is very slight, is rapidly succeeded by the second or paralytic stage. The guinea-pig

PLATE 1143.—FIG. 1.—Cow A.—Excited stage of rabies

PLATE 1144.—FIG. 2.—Cow A Excited stage, "log rolling."

PLATE 1145.—FIG. 3.—Cow A. (24 hours later.) Paralytic stage; endeavoring to rise.

PLATE 1146.—FIG. 4.—Cow B. Initial paralysis of left hind leg, with no excited stage.

PLATE 1147.—FIG. 5.—Cow B. Posture due to paralysis, after being driven for some minutes.

offers us a double advantage in the study of the disease in so far as it has a shorter period of incubation than the rabbit or dog, and consequently the disease becomes manifest sooner after inoculation; and secondly, in so far as it usually develops a pronounced, excited or furious condition. This condition may last for a few hours, say half a dozen, and then the second or paralytic stage comes on and the animal promptly dies. Occasionally the excited condition may pass off and the animal becomes quiet and remains so for several days, perhaps a week, when paralysis slowly sets in and death follows.

I have here for your observation several cages, in the first of which are perfectly normal guinea-pigs. The normal guinea-pig will never bite anything which you put into its cage, but prefers to keep out of the way. On the other hand rabies, whether in the dog or guinea-pig, is usually characterized by an excited stage. The dog while in this furious condition will bite at anything, and it will eat or swallow almost anything that is in its way. Bits of wood, stone, paper, hay, straw, or anything is devoured by such an animal. In these last two cages are some guinea-pigs which have been inoculated with rabies. They were inoculated on the 10th and are just six days under way. They developed the first symptoms this morning. You can notice the excited condition of the animals. Some of them will bite at these forceps, which a normal animal will never do. Before the morning is over I take it you will find that these animals will attack each other and develop considerable of a scrap.

When we examine the animal after it has died there is little or nothing to be seen by the eye. There is no marked pathological change, and the only thing to be seen is a slight hyperemia. Especially is this true of the membranes of the spinal cord and brain. Microscopical examination will show certain degenerative changes, but these are not always marked nor are they always constant. The striking feature is the absence of any pronounced disease change.

What is the cause of rabies? We may say that it is unknown. It is still a question as to whether it is a germ, a microbe, or whether it is something else; whether it is a ferment or an enzyme of the class of digestive ferments, such as pepsin and trypsin, and the like. I say we do not know which of these it may be. Ordinarily, we say that if a disease is capable of transmission from one animal to another and then to a third, fourth and fifth, and so on through a series of a hundred or thousand animals it means that there is a living cause multiplying in the bodies of those animals. This is certainly true in the vast majority of cases, and it is probably true for rabies. There is, however, a bare possibility that in the case of rabies the cause may be something else than a living organism. No one has disproved the possibility of germs being present, nor has any one proven their presence. Various observers have tried to find the germ, and several kinds of bacteria have been found, but no one has brought out an organism which we can definitely say is the cause of rabies.

I want to call your attention to rabies as it occurs in the cow. I have here photographs of two animals which I will pass around. One of these animals developed the excited stage. This was shown in various ways. In the barnyard, for example, when a log was placed on the ground in front of the cow, the animal would place its head behind the

log and roll it at full speed until it struck the barn or fence. Sparrow chickens and calves were chased by the cow, and women who st behind the fence were charged at by the excited animal.

Men, however, could stand around and watch it without in the le exciting the cow. After twenty-four hours the animal developed t paralytic stage which the third photograph shows. The other anim belonging to the same herd, and bitten by the same dog, showed the par lytic stage first. When forced to walk it limped with its left hind le (Fig. 4, Plate 1146), and when pushed faster the animal suddenly co lapsed to a very unusual posture, as shown in the photograph (Fig. 5, Plate 1147). I have mentioned, heretofore, that there are two stages, the excited and the paralytic. Exceptionally in animals the paralytic stage is met with from the beginning. This is usually the case with rabbits which lie in their cage without caring to move. In some guinea-pigs, —perhaps in one out of a dozen,—the quiet stage is present throughout. The animal then sits in a corner of its cage, paralysis develops, and it gradually emaciates and dies.

I have said that we know nothing as to the nature of the cause. We do know, however, a great deal about where this cause resides. We know that the saliva of a rabid animal is always dangerous. It always contains the poison, whatever this is, and this is true whether the saliva comes from the cow, horse, dog, or man. Again, one of the great discoveries of Pasteur was that the central nervous system was the place where the poison always rested. Out of this discovery the method for preventing the disease was elaborated. The brain, spinal cord and nerves contain the cause of rabies in a pure condition. It is not present in the blood or the spleen or the liver. Possibly it is not present in the muscles except so far as the nerves which are present contain it. The cause is present in many glands of the body, particularly the salivary, pancreatic and mammary glands; also in the suprarenal bodies.

The cause enters the body through a wound, and is thus brought into contact with an injured nerve. Along this nerve this cause,—whatever it may be,—advances. It does not go through the blood. Eventually it reaches the spinal cord and brain and from this it may now be distributed by other nerves. It is essentially a nervous disease, an infection of the nervous system.

When we study the material which contains the cause, we note one important thing, and that is, that the virus,—as we call it,—is easily influenced by outside conditions. It can be made to lose its virulence easily. This fact was demonstrated by Pasteur by inoculating monkeys. When a second monkey was inoculated from the first monkey it took a long time for the second animal to die, and finally after repeated inoculations the virus would not kill monkeys at all. When it is carried from one rabbit to another or from one cat to another the virulence is on the other hand increased. Thus, if some of the brain of a rabid dog is injected under the dura mater of a rabbit it will kill the rabbit in about fifteen or twenty days. If we transplant from this rabbit to another and so on in series the fatal period is shortened very materially. Pasteur found that after one hundred and thirty-three passages from rabbit to rabbit the period of incubation dropped down from fifteen to seven days. At the end of the 178th passage it killed in six days, and beyond that no one has been able to go, although the material has been kept now for t eighteen years, being transferred without interruption from rabbit

to rabbit. It is this material which kills in six days which was designated as the fixed virus by Pasteur, and which is used as the basis of the usual prophylactic treatment.

A great deal might be said concerning other conditions which will weaken the virulence of the cause. Thus it is easily acted upon by heat. A temperature of 50° C., which ordinarily will not harm bacteria, will easily destroy the rabic virus. Exposure to light, to desiccation, or to air kills it quickly, and the same is true of chemicals.

Let us now consider the question of diagnosis. In the case of the disease in man usually the history of a bite will indicate the nature. The symptoms are quite characteristic, and as a rule there need not be any difficulty in establishing rabies in man. An important thing is to establish the existence of the disease in the biting animal. This is a thing which every community should understand, so that in suspected cases it may take the steps necessary to obtain a positive diagnosis in the shortest possible time. In the first place the suspected animal, if possible, should be confined and watched. Of course there may be danger in doing this. Usually people prefer to shoot the animal. However, if possible, the animal should be confined and kept under observation. If the animal is rabid it will develop the full disease in a few days, and will be dead within a week. This is the best kind of a laboratory experiment. If there is any doubt as to the nature of the disease or if the animal has been killed, then it is necessary that animal experiments be made to establish a diagnosis. I may say that it is always well for the health officer and others to examine carefully the contents of the stomach of the supposedly rabid animal. Why do this? Because the animal in the rabid condition will eat or swallow anything, even stones, wood, paper, and all sorts of indigestible things. These, if found in the stomach, may be taken as a fair indication that the animal was rabid. It is not a proof, but is a very good indication. The next thing to do is to take the spinal cord or brain of this animal and inoculate it into another animal. I have said that the central nervous system always contains the virus in the pure condition. The local authorities as a rule are unable to perform these experiments, and in this case the material should be sent to some laboratory where the work can be done properly. Dr. Vaughan, yesterday, gave you directions for sending this material. It can be done in either one of two ways: The head and spinal column may be removed, leaving the bones intact, without exposing the brain and cord, and shipped to the laboratory. A much better way is for the health officer to secure this material and take the first train and bring it to the laboratory. I want to lay especial stress upon this point. We have had frequent experiences in which the material has reached the laboratory in a putrid condition on account of its being held up at various places. You can save time and anxiety on the part of the individuals by delivering the brain and cord of the animal in person to the laboratory. It is an economical procedure in every respect. If this can be done it is much the better method, but if not, the skull and spinal column should be shipped intact. Another procedure is to take some twenty per cent glycerin and sterilize it by boiling. Then, after it has become cool, some of the spinal cord and some of the brain can be placed in the glycerin and in this condition the material may be shipped without undergoing putrefaction. In twenty per cent glycerin the virus can live for weeks and even months. We recently tested virus, from a cow, which had been kept in an ice-chest in

glycerin for seventy-five days, and found that it would still kill animals with all the typical symptoms of rabies. The same material at the end of five months killed animals.

When the suspected material reaches the laboratory it is inoculated into rabbits and guinea pigs. The usual method is to trephine. A small opening is made into the skull and a little bit of a suspension of the cord or brain is injected under the dura. The animal suffers no particular inconvenience until it develops the disease. In this connection I must say that the period of incubation after inoculation with the brain from a diseased animal, from the so called street rabies, varies. It is not possible to receive a brain and sit down and make an examination and report the same day. The only reliable thing to do is to make the animal experiment. This may take a week; it may take two or even three weeks. It will depend largely upon the condition of the material when it reaches the laboratory. To illustrate this I took down from my notes this morning a few data upon this point. Two rabbits were inoculated from one dog; the first rabbit died in sixteen and the second in eighteen days after inoculation. A calf reached the laboratory in a fairly good condition,—by no means the best, however. Portions were introduced into guinea-pigs. One died in twenty-one and another in sixteen and one-half days. Portions of the brain of a dog were introduced into two guinea-pigs, which died in eighteen and one-half and nineteen and one-half days. Perfectly fresh material from a cow was introduced into rabbits; these died in fifteen and eighteen days. This same material killed a guinea-pig in eight days. You will notice, therefore, that it is not possible to give a diagnosis at once. We may have to wait two or even three weeks, and even longer if the material is very bad.

Now a few words as to the restriction of the disease. If there are cases of rabies in the neighborhood it is eminently desirable that all dogs shall be muzzled for a period of three months. Unmuzzled dogs should be killed promptly. This is the plainest possible duty in case of an outbreak of this disease. I note that there are difficulties in doing this, as was mentioned yesterday by Dr. Chase. All dogs or other animals which have been bitten by a suspected dog should be confined and watched. Do not kill them, but watch them and see what happens. This is an experiment in itself. They should be watched for perhaps three months, in which time the disease will manifest itself. If the animals are valuable it may be desirable to save them, and it has been suggested by some that such animals be vaccinated.

When a man is bitten there are two things to consider. In the first place, the local treatment, the cauterization of the wound. Usually a hot iron is used for this purpose. Better, perhaps, is the use, under an anæsthetic, of some strong chemical, such as fuming nitric acid, which procedure has been recommended by Cabot. Experimentally it has been shown that of the infected animals fully ninety per cent can be saved if within twenty-four hours after the accident the wound is disinfected by a radical procedure, such as I have indicated.

The second thing to consider is vaccination. There is absolutely no question as to the value of preventive vaccination in man after having been bitten by a rabid animal. There are two methods in use in this connection. One is the old Pasteur method, which is used practically all over the world with the exception of one or two places. In this method *the spinal cord of a* rabbit which died in six days as a result of the

inoculation with the fixed virus, is taken and allowed to dry for different periods of time. This is known as the desiccation process. When a person is to be treated, the first injection he receives will be one with a cord which has been drying for fourteen days. This cord is so weak that it will not produce the disease in an animal or in man. After the injection of the 14th day cord, he receives one of the 13th, 12th, 11th, 10th, and so on. Eventually the man can be given an injection so strong that it would have killed him if given at first. By a series of vaccinations in this way, with the desiccated cord, it is possible to prevent the disease.

The so-called Budapest method is practically the same. In this method the desiccation is replaced by dilution. I have already stated that if the brain or cord of an animal that has rabies is diluted with ten thousand parts of water it can be injected into an animal without producing the disease. The virus has been thinned out, and the small amount injected will not produce the disease. After an injection of the 1 to 10,000 dilution the animal or man can be given a 1 to 9,000 injection, and so on until an injection of a 1 to 200 dilution is given. In the end the individual is protected the same as in the Pasteur method. The two methods, although apparently different, are really the same. Desiccation thins out by a process of killing the virus. Dilution does the same thing mechanically.

It should be stated that there is no cure for rabies. The safety lies in restricting animals which have been bitten, destroying those which are rabid, and in vaccinating individuals who have been exposed to the disease.

DISCUSSION.

MR. WELLS: This has been an exceedingly interesting paper. Although rabies may not be a disease extremely common at the present time, it is sufficiently so to render it necessary that we know what to do if the disease breaks out in our neighborhood. This exemplification of experiments on animals is very striking, and I do not think that any of you will go away with the idea that this is not a specific disease. There are sentimentalists who profess to believe that there is no such thing as rabies. By means of this kind of work, in this laboratory and others, we have been shown the character of this disease in a way which is striking and conclusive. Are not your lives of more value than many guinea-pigs?

DR. ————: Are the preventive inoculations for rabies given in this laboratory?

DR NOVY: No preventive inoculations are made here. It is necessary to go to a Pasteur Institute. It would require an unusual amount of labor and a special equipment to carry on the work properly.*

DR. KIEFER, Detroit: I have been very much interested in Dr. Novy's presentation of the subject. It is one on which we all need instruction at this time. We have had several cases of rabies in Detroit, and I am

*Since this statement was made the Board of Regents of the University appropriated $2,500 with which to carry on the Pasteur treatment at Ann Arbor. The inoculations will be made in the hygienic laboratory of the University. Correspondence should be addressed to Professor V. C. Vaughan, Director of the Hygienic Laboratory, University of Michigan.

glad to have gathered considerable knowledge on the subject at this time. I have one or two questions that I would like to ask Dr. Novy, but before doing so I would like to remark on the muzzling of dogs. Everyone will agree that all dogs should be muzzled when there has been one case of rabies in a community. It is difficult to get an ordinance in a community to compel such muzzling; this is one of the things which a conference of this kind might take up and get a State law.

The questions which I want to ask were partially answered in the discussion, but not entirely. Dr. Novy said that the cause of rabies is sometimes found in other parts of the body besides the saliva, sometimes in the mammary gland, sometimes in the milk. By getting into the milk can it be transferred to the human beings who partake of the milk? This was brought up to me particularly in Detroit about four months ago in the case of a rabid cow. I understand that the danger of contracting the disease in that way is very slight. I would like to know if there is any danger at all.

The other question is in regard to the cauterization of the wound and possible subsequent vaccination. If a person has been bitten by a rabid dog and the wound is immediately cauterized with nitric acid, are we then sufficiently sure of preventing the disease not to advise a trip to the Pasteur Institute?

DR. WILBUR: I was very glad to see that Dr. Novy brought out the distinction between the fatality of hydrophobia in man and in animals. Hydrophobia is one of the most dreaded, and perhaps one of the most fatal of diseases. The mortality is one hundred per cent in man, but as Dr. Novy says, only about twenty per cent of persons that have been bitten contract the disease and die. In Pasteur Institutes it is common to express the proportions of deaths to cases treated, and in many of these institutes thousands of cases have been treated in which the average mortality has been one-half to one-fourth per cent. It is so well known that hydrophobia is a fatal disease that we are apt to think that we have here a reduction from one hundred per cent to one-fourth per cent. Dr. Novy has suggested, however, that the proportion of those who contract the disease after having been bitten is only about twenty per cent and we may assume that this per cent only of the persons treated in Pasteur Institutes would have died without treatment. This reduction from twenty per cent to one-fourth per cent, however, is a very great one. If these cases had not resorted to Pasteur Institutes the mortality would not have been as high as we might expect. In the United States in 1890 out of a million deaths one hundred and forty-three resulted from hydrophobia, and in 1900 one hundred and twenty-three per million. In England the mortality from hydrophobia has varied from two to nothing per million of population; that is to say, in one year there were two deaths per million. After that year ordinances went into effect generally for muzzling dogs and the mortality fell in eight years to one per million and then to nothing per million, and in the last two years there have been absolutely no deaths in England and Wales from hydrophobia.

DR ————: Are there any cases on record where the disease has been communicated by the bite of squirrels? How long an immunity is conferred by the Pasteur treatment? In regard to muzzling dogs, a

muzzle irritates more or less and formerly it was said that they developed hydrophobia from that. Is it not possible that the animal may have received a small amount of the virus, not enough to cause it to contract the disease if left alone, but which it would develop if kept confined and irritated by a muzzle? Would not this amount of excitation make a small quantity of the virus work?

Is it not possible that a dog may develop rabies from the consumption of offal around our towns and cities? We very frequently see dogs gnawing bones in all states of putrefaction.

W. M. POWERS, Benzonia: It seems to me that we are here to get into direct touch with the sources that will bring about the proper enforcement of laws touching upon sanitary conditions in our respective districts. There has been considerable said in regard to getting legislation. We have plenty of legislation to meet all of these conditions until we come in contact with the rural districts. Here we meet men that are intelligent in many ways, but narrow in regard to problems of this character. Our vicinity is something of an educational center, and the founders of our school are leaders in our community. When I mentioned the communication of the State Board of Health in regard to this conference these people simply set back and would not confer with the council in regard to sending a delegate. They did not believe that a person could bring back anything that would be of any value to them. If there is no committee on publication, it would seem to me to be a wise thing to have a committee of this kind in order that such persons may be reached with reasons which may awaken the latent intelligence long dormant in their systems. The local health officer is considered aggressive when he mentions these matters. Some outside force should be brought upon these conditions. The main thing is to get this sort of people to see the necessity of enforcing our laws.

DR. JOHNSON, Adrian: Recently a dog came up through our township, from a neighboring one, biting other dogs. I got track of all the dogs that had been bitten and spent the day getting them corralled. The people thought that I had their twin babies and was going to kill them. I got a report back in sixteen days that the first dog was not rabid, and consequently the dogs had to be let loose. One of them went up to Hudson and bit some children up there, who are now undergoing treatment. There are at least eight dogs in our town that were bitten by the first dog. What am I up against? Are these dormant cases? In the same neighborhood through which this dog came is a woman who was bitten by a pet cat that had always been perfectly quiet before. The dog was in this yard, I know. I have the cat shut up. I would like to see a law on the books that every dog should be muzzled at the order of the board of health in cases of rabies or suspected rabies in the neighborhood.

Motion made and seconded that the legislature be memorialized to pass an act giving every local board the right to muzzle every dog, in cases of rabies or suspected rabies. Carried.

DR NOVY: As to the milk: Rabies is an inoculation disease. If we feed brains of rabid animals to a dog or other animal, they will not contract the disease unless there is a wound in the mouth. Milk may exceptionally contain the virus of hydrophobia, and there might possibly be

an abrasion in the mouth of the person taking it. Of course it is not advisable to use the milk from a rabid cow or from one under suspicion.

For the same reason the use of offal by animals is not going to cause rabies. In the first place the virus is not there, and if it were it would necessitate an actual wound in order to develop the disease.

As to the cauterization of the wound: This is simply a temporary preventive measure, and I should always look upon it as such. Given the best method of cauterization, as in the case of nitric acid, ten per cent of the animals still die. This is simply a temporary expedient, and vaccination should be made as soon as possible.

One should never wait for vaccination until a diagnosis is established, if the wounds are serious or deep, and especially when about the face, neck or hands. The patient should be immediately sent to a Pasteur Institute, because an animal when inoculated may live for eighteen or twenty days. To wait for such a delayed diagnosis is a serious matter, since every day counts. The preventive treatment should be begun within a few days. Persons who have been severely bitten may die within three weeks.

As to the possible development of rabies in a dog on account of its being confined I would say that dogs are kept in laboratories for months and years and never develop the disease spontaneously. Moreover, if we inject a 1 to 10,000 dilution of the virus and keep the animals in durance, they will not get rabies. Something more than keeping the animal confined is needed and that is the virus of the disease.

As to the question of immunity: Dogs when treated, possess a varying immunity. Some dogs have been immune for three or four years. In others the immunity has not lasted for more than a year. The immunity is liable to persist from one to three years.

APPENDIX.

SUGGESTIONS REGARDING THE TREATMENT OF PERSONS BITTEN BY ANIMALS SUPPOSED TO BE RABID.

In consideration of the fact that there has been for some months and is now a considerable epidemic of rabies among animals in various parts of Michigan and that a number of people have been bitten by animals possibly or certainly mad, it seems advisable to offer some suggestions concerning the treatment of such persons. The first and most important thing is the immediate treatment of the wound, and cauterization is generally known to be the proper procedure. There seems, however, to be some misapprehension, even among physicians, as to the period of time which may elapse before cauterization becomes useless and as to the proper method of cauterizing. A number of cases have come to my attention where the physician did not cauterize because a few hours had elapsed after the bite. There is, however, abundant proof that cauterization is often effective when done as late as twenty-four to thirty-six hours after the injury, and it is possible, at least, that good may be done by it even at a later time. I should say, therefore, that cauterization ought always to be performed if the wound is brought to the physician for treatment during the first three days.

As to the caustics used: Probably the most common and least efficient is silver nitrate. Silver nitrate, or "lunar caustic", is at best only a feeble caustic, and has the further disadvantage of being solid, and, therefore, not reaching all parts of the wound. The caustic should be a liquid, and the most efficient one which is readily obtainable everywhere is pure or fuming nitric acid, which should be applied with a glass rod to all parts of the wound, after it has first been thoroughly laid open and scrubbed—under anesthesia if the patient be a child or the wounds severe and painful. Ninety-five per cent carbolic acid is moderately efficient if nitric acid is not to be had. The actual cautery is inefficient because it does not so readily reach all parts of the wound. If this treatment be thoroughly carried out it may prevent some of the unfortunate cases where the incubation period is so short that the Pasteur treatment has no chance to be effective before the disease develops.

With regard to sending patients to the Pasteur Institute for treatment: If there be any good reason for believing that an animal which has bitten a human being is mad it is unwise to wait until the animal dies of hydrophobia, or until the disease has been experimentally transmitted from this animal to others before sending the patient for treatment, as it is of the utmost importance that the treatment begin as early as possible. If the animal shows symptoms strongly suggestive of rabies it is best to send any persons who have been bitten to the Pasteur Institute and let the treatment begin at once. If the animal recovers or test animals do not develop the disease, the treatment can be stopped and will have done no harm.

THOMAS B. COOLEY,
Assistant Professor of Hygiene in charge of Pasteur Institute.

PASTEUR INSTITUTE,
THE UNIVERSITY OF MICHIGAN,
Ann Arbor, April 4, 1903.

Persons bitten by any animal suspected of being rabid should go at once to the Hygienic Laboratory of the University of Michigan, at Ann Arbor, and the brain and spinal cord of the animal which has bitten the person should be sent there. These persons will be treated free of charge if residents of Michigan, but must provide their own room and board. Each person should bring a statement of bona fide residence, signed by the president or clerk of the township, or village board.

MUZZLE ALL DOGS AT LARGE.

The State Board of Health advises every local board of health in Michigan to immediately make and publish regulations ordering the muzzling of all dogs at large and the killing of all unmuzzled dogs found at large, and to make provision for the prompt and effective execution of such regulations.

Local boards of health have full power to make such regulations which, when published, have the force of law, the violation of which is a misdemeanor. This power or authority is implied, and is also given by statute in Michigan, in townships by Sections 4412 and 4413, Compiled Laws of Michigan, 1897; and these sections are made to apply in cities and villages by Sec. 4459, excepting in cases where the charters of such cities and villages contain provisions inconsistent therewith.

The section of law specifying the manner of the publication is as follows:

"Sec. 4416. Notice shall be given by the board of health of all regulations made by them, by publishing the same in some newspaper of the township, if there be one published therein, and if not, then by posting them up in five public places in such township; and such notice of said regulations shall be deemed legal notice to all persons."

The following form is recommended:

OFFICIAL PUBLIC NOTICE BY THE BOARD OF HEALTH. REGULATIONS FOR THE PREVENTION OF HYDROPHOBIA, BY THE RESTRICTION OF RABIES.

WHEREAS, rabies is widely disseminated and is epidemic in Michigan; and

WHEREAS, the State Board of Health has recommended that municipal and township authorities order the muzzling of all dogs at large, and make and publish regulations to that effect;

Resolved, That the local board of health of the township [city or village] of ....., county of ....., State of Michigan, hereby makes and publishes the following regulation:

All dogs, male or female, not effectually muzzled, running at large on any street, alley or public grounds, or private premises, not the premises of the owner or keeper thereof, may be killed by any person; and it shall be the duty of every constable [policeman, or other peace officer] of the said township [city, or village] and he is hereby ordered to kill any and all such dogs.

[Name of place, and date.] Attest.

.....

Clerk of the Board of Health.

MORTALITY FROM CANCER IN MICHIGAN.

BY CRESSY L. WILBUR, M. D., CHIEF OF DIVISION OF VITAL STATISTICS, DEPARTMENT OF STATE, LANSING.

I was considerably alarmed when I first saw the program for this morning's session and observed that a post-mortem was to be immediately held on my paper,—not that I have any objections to post-mortems in themselves—they are just as important in vital statistics as in pathology —but you will readily see that one may feel at first a slight degree of reluctance in personally providing the corpse, and I knew in a moment, when I saw that the junior professor of pathology was to hold the scalpel, that even the very title of my paper would constitute some

degree of offense to a modern pathologist—"The Mortality from Cancer in Michigan;" why not the mortality from "carcinoma," "sarcoma," or some exact expression, instead of the very indefinite term "cancer?"

Well, I can only say that in writing a paper on the mortality from cancer without attempting to distinguish the component elements of this somewhat indefinite term, that I am limited by the necessary restrictions and imperfections of vital statistics as applied to the practical compilation of causes of death received in a registration office. The pathologist is at liberty to apply the very latest scientific distinctions to his cases. He may divide and subdivide deaths from neoplasms so that not only the exact organs and parts of the body affected are definitely stated, but also the essential character of the new growths in the strictest pathological sense may be indicated. If all deaths from new growths were reported by competent pathologists, then there would be no reason why these distinctions should not be fully carried out in vital statistics, but, on the contrary, the statements in regard to causes of death are reported by physicians, many of whom have been for years out of college, some of whom have not kept up to the latest advances of pathological knowledge, and a not inconsiderable portion of whom, I regret to say, have little knowledge of pathology and never had. Although we now have a law for the registration of physicians in this State, there are still some loopholes in it, and, even at its best, it must be remembered that the bars were absolutely down until a very short time past. As a consequence, the returns of deaths from cancer, including all forms of malignant neoplasms, are very unsatisfactory from the point of view of exact pathological knowledge.

Going back a few years to the period before the operation of the present registration law under which physicians are now required to report causes of death, we come to an even more unsatisfactory condition of affairs. From 1867 until 1897 the registration law in this State merely required that supervisors should go about in the spring at the time of making their annual assessments and inquire of the families with whom they came into contact whether any deaths had occurred during the preceding calendar year. From the families they obtained such statements as they could in regard to the cause of death, so that the original process of information was substantially as follows: The attending physician diagnosed the case and gave more or less information to the family in regard to its nature. After waiting a considerable period after the death of the individual, varying from three to fifteen months, the family of the decedent gave as correct an account of the cause of death, based more or less remotely on the physician's statement, as they could to the supervisor, and the supervisor, who was, of course, entirely ignorant of medical terms, copied this statement and turned it over to the county clerk, who was likewise presumably ignorant of such matters. The result was finally sent to the State Department for compilation, the medical statements being based on hearsay testimony, and having been distorted more or less by being copied several times by persons unfamiliar with medical terms. The question arises, are such reports of any value whatever, and can any dependence be placed on them for any accurate information in regard to the prevalence of disease?

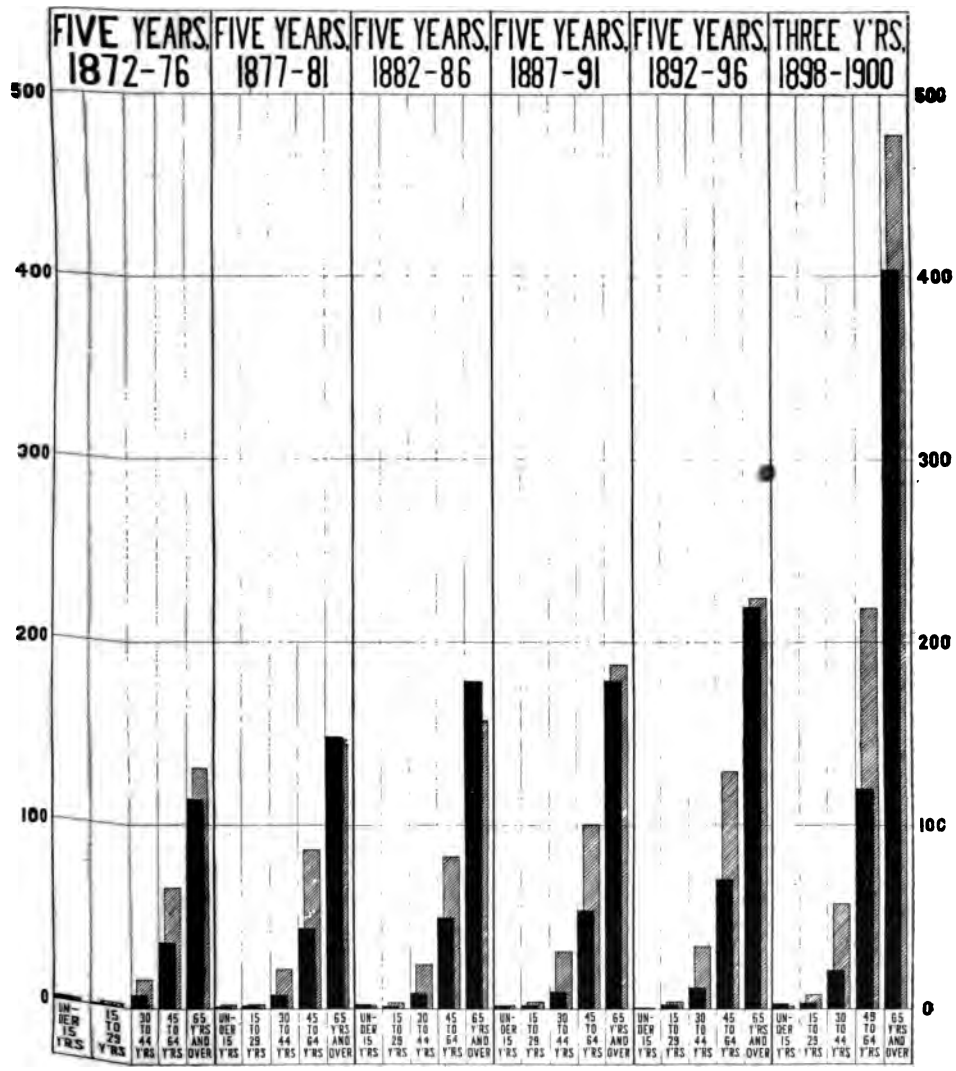
In spite of the very unsatisfactory methods used for the compilation of mortality statistics—and I may say that the same unsatisfactory methods still persist in this State for the collection of births—I am in-

clined to think that we may use the information collected in this way to a limited extent, provided we use it very guardedly. and with a thorough knowledge of its inherent defects. The method of collection by enumeration after the close of the year and by unqualified persons is the method pursued by the last United States census in non-registration states, and the vital statistics collected in this way under the Michigan State law are the only statistics that we have covering the last third of the last century. We may, perhaps, assume in using these statistics that if the amount of imperfections was relatively constant, then the results, although imperfect, may safely be taken for internal comparisons, although the rates based on such grossly inaccurate returns cannot, of course, be compared with fairly reliable death rates in other localities. When we have considered the great imperfections belonging to the methods of collection of data, then it is at once apparent that an attempt to make the definite pathological distinctions, such as deaths from "carcinoma," "sarcoma," etc., would be utterly absurd. We are fortunate if we can get an approximate idea of the general variations of total deaths from all forms of malignant neoplasms.

The condensed results of an analysis of the returns of deaths from cancer in Michigan for some thirty years past are graphically shown in the diagram [Plate 1141] kindly prepared by Mr. H. B. Turner of the office of the State Board of Health from statistics collected by the Department of State. As a preliminary step in the preparation of these statistics, the deaths from cancer and tumor stated separately were abstracted from all of the Michigan registration reports beginning with that ending April 5, 1868, and closing with the statistics for 1897, the last year under the old law. These primary figures were printed as an appendix to the Thirty-first Registration Report of Michigan for the year 1897. Examining the figures given, it appears that there was a change made in the method of compilation beginning with the year 1872. Prior to that time, the ages of decedents were stated in decennial periods only. From 1872 to 1897 the ages were given for each five-year period of age. In the estimates of population used in the Michigan reports. the following convenient divisions were employed: Under 15 years; 15-29 years, inclusive; 30-44 years; 45-64 years, and 65 years and over. It thus appears that without considerable inconvenience comparison of age periods could be made only for the years beginning with 1872. It also appears that the age periods thus chosen are substantially the same as those employed by the United States Census in the discussion of cancer, and as will appear by consideration of the diagram and the figures upon which it is based, these periods are well fitted to show the salient facts in regard to the increase of the disease.

We observe that for the period under fifteen years of age the rates both for males and females are so low as to be quite insignificant. Possibly some of the deaths returned and complied for this period from "cancer" are in reality those of infants dying from "canker" or "cancrum oris", the terms being confused by unqualified reporters. At any rate, the number of deaths and death rates at this period are altogether insignificant. The same is practically true of the following period, including the ages 15-29 years, inclusive. although we may note a slight excess of the death rates of females at these ages.

CANCER IN MICHIGAN, 1872-1900.



DEATH RATES PER 100,000 POPULATION OF SAME SEX AND AGE.

MALES ■■■■■ FEMALES ▨

PLATE 1141.

NOTE.—The statistics for the three years 1898-1900 are the results under the law requiring the immediate registration of deaths (in effect August 29, 1897), and hence cannot be compared directly with the quinquennial periods without making allowance for the increased accuracy of registration.

In the November issue of the *Michigan Monthly Bulletin of Vital Statistics,* in which some of the statistics relating to the increase of cancer have been presented in condensed form, the per cents of increase of the death rates of each sex from cancer may be compared from one quinquennial period to another. These per cents are irregular and sometimes show decreases for the age periods under thirty years. When, however, we come to the age periods from thirty years upwards, we observe that the rates are higher, and that their character as showing a more or less uniform tendency is more definitely pronounced. In these periods, the general rule is that the death rates of females are higher than those of males. The only exceptions are the death rates of females over sixty-five years of age in both of the quinquennial periods 1877-81 and 1882-86.

In general, a fairly uniform amount of increase is shown from one quinquennial period to another for each age period and sex. The only exceptional cases showing a decrease in the rates from one period to another are those of females aged 45-64 years in 1882-86, and of males over 65 years in 1887-91 as compared with the preceding five-year periods. You will note that in this comparison I have not referred to the rates given for the three years, 1898-1900. These rates, which are distinguished from the others by the heading of the column (red),* are those collected under the present registration law and are approximately accurate. It will be seen at a glance how large an increase there is as compared with the last quinquennial period under the old law, but it is evident that a large proportion of this increase is fictitious, the difference being due simply to the greater accuracy of registration. The general relations of the age periods shown in the statistics collected under the new law resemble those indicated under the old system, and if we should apply some uniform percentage of increase to the old statistics so that they might be brought up to a basis of comparable equality with the new data, it would seem that the general tendency of increase would be confirmed; that is, the three years, 1898-1900, would probably show a slight increase for each age period over the preceding five years, although the increase would not be nearly as large as that indicated on the diagram.

The general conformity of the figures collected by these two entirely different methods and the general upward tendency for each age period and each sex in the statistics collected under the old law are strongly confirmatory of the belief in their general validity, although the exact amounts are not directly comparable with more accurate statistics. We may say, with considerable certainty, that each age period at which cancer is sufficiently prevalent to give fairly reliable statistics has shown a marked and progressive increase from year to year during the entire period of registration in Michigan under the old law, and this increase is continuing during the present time.

Here we may note that it is necessary to take into consideration the natural variations in the population of the State as affecting the death rates from cancer and other diseases which bear a close relation to the age distribution. We have seen that the death rates for the age periods under thirty years are quite insignificant, hence, if the population of the State should increase largely by the birth of children or by the immigration of young adults, there would be no tendency to an increasing death

*In the original diagram.

rate from cancer, but rather the reverse. On the other hand, if the people of the State continue to grow older and the increase in age of the present population is not compensated by the increase in the number of children, if also the young adults who immigrated into this State some years ago have increased in age, while the amount of recent immigration has fallen off, then we should have a relative increase of persons in the population at the older age periods, with a consequent greater liability to deaths from cancer. In fact, the operation of sanitary measures, whereby the number of deaths of infants and children from acute infectious diseases is diminished, and, later, the number of deaths of young and middle aged adults from tuberculosis is also checked, would have a tendency in itself to increase the mortality from cancer, since it is chiefly from the survivors at the older ages that this mortality is recruited. It thus appears that an increase in the deaths from cancer may possibly be a sign of a favorable sanitary condition in the community, although it would be very desirable, of course, if the prevalence of this disease could be checked in the same manner as other admittedly infectious diseases have been restrained.

The general indications relative to the increase of the mortality from cancer in Michigan for each sex and age period, as derived from the study of the State registration returns, are confirmed by comparisons of the death rates from this disease at the last two United States censuses. Here we may note that in 1900, for the first time, Michigan appears in the census volumes as a registration State, and I desire especially to call the attention of the health officers present to the fact that very valuable statistical information can be found in these census volumes, not only in regard to the prevalence of cancer, but also in regard to the mortality from all other diseases in this State during the census year. For each important disease a special map is given showing the distribution of the mortality in this State by counties. Through the kindness of Mr. W. A. King, Chief Statistician for Vital Statistics of the Census, I have some copies of the map showing the distribution of deaths from "cancer and tumor." As in previous censuses it was "impossible to distinguish them as they are commonly reported," that is to say, it is well known that many of the deaths reported from "tumor" are in reality due to cancer, so that for many purposes it is desirable to combine the two terms.

In the maps you will observe that the highest rates of mortality are in the Southern counties of the State. This does not necessarily indicate that these counties are less favorable than those of the Upper Peninsula and of the Northern section of the Lower Peninsula in regard to this disease, but simply that the age distribution of the population is more conducive to a high death rate from cancer in the southern and oldest settled part of the State. It is probable that the few counties in the upper part of the State that show an unusually high death rate from cancer may do so from the fact that very few deaths from all causes are reported and that consequently the volume of returns was probably not large enough to give entirely satisfactory results for a single year. I hope that the health officers will get in the habit of making frequent use of these statistics of Michigan as presented by the census office, and am very glad to say that under the permanent organization of the census office, we shall have annual reports of the statistics of Michigan for each disease in connection with those of all the other registration States.

As Michigan was not a registration State in 1890, the mortality from cancer in the two census years 1890 and 1900 cannot be directly compared, so that we can only note the general tendency of the increase of cancer in the registration area.

The age periods chosen by the census for the study of cancer are five, namely, under 5 years; 5-14 years; 15-44 years; 45-64 years and 65 years and over, thus closely agreeing with the age periods represented in the diagram for Michigan.

For these ages, excluding the rates under fifteen years of age, which are too low to be of any special significance, a marked increase was shown from 1890 to 1900 for the total registration area, for all cities, for the registration states as a whole, the cities included in them, and rural population and for cities not in the registration states, so that without exception in every class of population covered by the exact registration of deaths, a marked increase of mortality from cancer and tumor occurred from 1890 to 1900.

The average age of decedents from cancer and tumor in 1900 was 57.2 years as compared with 56.1 years in 1890. From cancer alone the percentage of deaths to all known causes was 29.5 in 1900 as compared with 22.5 in 1890. The death rate for the registration area for cancer alone rose from 47.9 per 100,000 population in 1890 to 60.0 in 1900. In England and Wales the corresponding death rates were 67.6 and 82.9 respectively.

While there can be no doubt as to the marked increase in reported cancer not only in Michigan but also in the United States as a whole, and in many other countries, there has been considerable questioning and uncertainty as to whether this increase might not be more apparent than real. I have referred to the increase that naturally attends the preponderance of older ages in the population. It is difficult to make an exact allowance for this factor, but comparing two individual years, 1870 and 1890, with an interval of twenty years between them, and employing a method similar to that of computing the mortality index, I showed in the *Bulletin of Vital Statistics,* for November, 1902, that if the population of Michigan in 1890 had approximately the same distribution as that in 1870, then the death rates from cancer per 100,000 population in 1890 instead of being for males 21.5 per 100,000 population and for females 29.7 per 100,000 population, would have been about 17.2 and 23.7, respectively. That is to say, the less favorable distribution of the population in Michigan by ages after a lapse of twenty years would account for an increase of about twenty-five per cent for each sex in the total mortality from cancer. As the mortality from cancer increased from 1872-76 to 1892-96, a twenty year interval, 113.8 per cent for males and 122.4 per cent for females, it appears that there is a very large difference, amounting to perhaps 80 or 90 per cent, that cannot be accounted for on the ground of less favorable age distribution.

Another consideration that has led some to believe that cancer has not increased to the extent that the figures would at first view indicate, is that there may have been a change in the accuracy with which this disease is reported as a cause of death by physicians. This probability is strongly suggested by the fact that in some places, while the total deaths from cancer have increased, and also deaths from cancers in inaccessible parts of the body, as in the stomach and liver, the death rates of acces-

sible cancers, as of the breast, tongue, uterus, etc., have not increased, but have even actually diminished.

A table was given in the November *Bulletin* showing the per cents of cancer of the various organs as returned under the old registration law, and also the corresponding results of the first three years under the new law. The most marked change in the proportional deaths during the twenty-five year period under the old law is the diminution in the percentage of deaths from cancer of the breast in females. Only about one-half of the total number of deaths from cancer have the organ or part of the body affected assigned, a condition in which the present law shows a very marked improvement, only about one-fourth of the total number of deaths being thus carelessly returned. But this proportion is far too high, and I may, perhaps, properly call the attention of the health officers at this point to the necessity of seeing that returns of deaths from cancer state the organ of the body affected in all cases. It is desirable also that the organ primarily affected should be known. Very possibly the diminution in the proportion of deaths from cancer of the breast may arise from the fact that such cases are more frequently operated upon than formerly, so that death may result, not from cancer in its primary seat, but from secondary infection.

The United States census statistics for the registration area show that the mortality from cancer of the breast in females was practically stationary from 1890 to 1900 for the very important age period 45-64 years, although it rose from 47.3 per 100,000 population to 59.6 per 100,000 population for decedents aged 65 years and over.

Cancer of the liver and cancer of the stomach show greater amounts of increase for both sexes from 1890 to 1900 and cancer of the uterus also shows a considerable increase for the age period sixty-five years and over. For the period forty-five to sixty-four years the amount of increase was rather less than the average, rising from 54.0 to 59.1 per 100,000 population.

Besides the variations in the mortality from cancer of various organs as tending to show more or less improvement in the accuracy of returns, there are other indefinite causes whose fluctuations must be taken into consideration in making a complete analysis of the subject. Thus, if the mortality from cancer of the stomach shows a marked increase while the mortality from indefinite diseases of the stomach or digestive system diminishes, there is room for a presumption that deaths from some of these indefinite causes have been more accurately reported in recent years. It is for this reason and because all of the possible complications have not yet been studied that I hesitate to emphasize as much as I might otherwise do, the apparent marked increase in the mortality from this disease. It is probable that there has been an increase. I think from an examination of the statistics of Michigan and comparisons with those of the registration area and with other countries that there has been a large increase, but until further studies have been undertaken in this connection, I should hesitate to say that the mortality from cancer had actually doubled during the past twenty years, as the figures would apparently indicate, or that it has actually increased in approximately as large a proportion.

Vital statistics relating to cancer are among the most difficult that we have to deal with, and in concluding this paper, which must be regarded as a mere *preliminary statement of* statistical results, but which I hope

may be of some interest, and at least suggestive value, I desire to urge as strongly as possible that greater care and precision be used by physicians, as far as possible, in returning deaths from all forms of neoplasms. If possible, the proper scientific term should be used, as "carcinoma," "sarcoma," etc., and in connection with the form of the cancer, its primary seat, when known, and also the parts of the body secondarily affected should be given.

In the system of nomenclature recently prepared by Dr. Tatham for the use of the English Registrar General, deaths from cancer are stated under three titles: (1) "Carcinoma;" (2) "Sarcoma;" (3) *"Cancer, Malignant Disease* (not otherwise defined)." Probably in this State and also in many others, the majority of returns would go under the third title, so that deaths included under "carcinoma," and especially "sarcoma," would be too few to give reliable results. Nevertheless, this distinction is important and by insisting upon it in certificates of death some progress might be made.

It is, perhaps, of more importance, and this point seems to have been omitted by the Registrar-General's classification, to state the location of the malignant neoplasms. While we cannot be sure of the exact nature of the new growth in many cases reported, it is important to know what organs or parts of the body are affected.

As Dr. Guilfoy, Registrar of New York City, said in a recent paper before the New York State Conference of Health Officers at Albany:

"Within the past few years the question has arisen as to the increase of cancer since 1880, and the statisticians have debated among themselves as to whether this increase was a real one or a statistical one; the gross figures show an immense increase, in some cities the figures being trebled; naturally the cause was sought for; the influence of medical and surgical progress would seem to account partly for the increase, especially the operation of laparotomy; another cause was probably due to more careful certification as to the cause of death; the question then revolves around the seat of the cancer. Was the cancer in the accessible parts, or vice versa? Some few of the cities and states of continental Europe were in a position to furnish death rates of cancers of the face, tongue, mouth, breast and uterus, on the one hand, and of the liver, stomach, kidney and bladder on the other hand; the death rates of the accessible cancers had not increased; some had diminished; the rates of the inaccessible ones had all increased. The figures produced served to throw considerable light upon the question. The Bertillon classification specifies the seat of all cancers. I simply mention this as an argument in favor of this system."

I sincerely hope that in a few years we may have statistics of a more satisfactory character, and which will afford a sufficient basis for more definite statements in regard to the increase from cancer. This can certainly be brought about if the physicians and the organized health associations of the State take especial interest in the accuracy of returns of deaths made from this cause.

In many cases the State department has corresponded directly with physicians who reported deaths from cancer, and, as a rule, more definite and satisfactory information has been obtained, so that it is usually within the power of the reporting physician to make a fairly definite and

accurate statement. If the local registrars and health officers acting as registrars can be educated to insist upon such reports, the results will be of greatly increased statistical and medical value.

DISCUSSION, LED BY A. S. WARTHIN, JUNIOR PROFESSOR OF PATHOLOGY IN THE UNIVERSITY OF ANN ARBOR.

The records of the pathological laboratory and of the hospital of the University of Michigan are of some interest in this connection, and I will therefore place a few of these records on the blackboard. In the first place I will give the hospital records for the last ten years.

Year.	Total Cases.	Cancer (Carcinoma).	Per cent.
1894	1,502	61	4.0
1898	1,715	75	4.3
1899	1,788	100	5.5
1900	1,957	80	4.0
1901	2,195	89	4.0

In the last ten years, while the number of cases has increased, the relative proportion of cancer has not increased very much.

The separate clinical records are of great importance, and as most of the cases come from the surgical and gynecological clinics, I have taken the records from them. I am indebted to Dr. Nancrede for assistance in this regard.

Surgical Clinic.

Year.	Total cases.	Carcinoma.	Per cent.
1895	0	0	0
1896	226	15	6.6
1897	297	20	6.7
1898	427	26	6.0
1899	420	30	7.1
1900	562	27	4.8
1901	530	34	4.5
1902	736	36	4.8

In 1902 there were 736 cases, 36 being cancer, or 4.8 per cent. The total number of cases treated in the clinic has almost doubled, while the per cent of cancer is less. The same thing is shown in Dr. Peterson's clinic. What would explain this? Is the number of cases actually diminishing, or do fewer cases come to the hospital? Perhaps the members of the profession are becoming so much better educated that they are doing the operations themselves, so that the cases do not get to the hospital as they once did. Another possible explanation is that many physicians regard uterine cancer as hopeless and do not send the cases at all.

The records of the pathological laboratory are of greater value than this because they represent largely material which was sent in as sus-

pected malignant cases. I give the records since my own work in the laboratory, as there was no record before this time.

Year.	Total cases.	Carcinoma	Per cent.
1895-96	126	33	21.1
1896-97	158	31	19.6
1897-98	172	46	26.1
1898-99	243	62	21.4
1899-00	293	62	21.19
1900-01	401	83	27.7
1901-02	501	87	17.1

These cases were sent in from all over the State with the suspicion that they were malignant. The results of the microscopical examination show certainly that there is a great decrease in the number of cases of carcinoma sent in for diagnosis; and which, throughout the State, are suspected of being malignant. Our autopsies here number from ten to thirty per year, and we have a mortality due to carcinoma of ten per cent in our small number of autopsies. The statistics which are given here are of very little importance to the pathologist. I do not think that our statistics at the present can be used as any data for the inference that carcinoma is either increasing or decreasing. I have but very little faith in the majority of clinical diagnoses of carcinoma unsupported by autopsy or microscopical examination. The cases in which a definite microscopical diagnosis is made are the ones which appear to be decreasing, while those which are diagnosed clinically are the ones which are on the increase. The conclusion cannot be drawn until the diagnosis is confirmed by microscopical work or by the autopsy. The statistical field is, of course, in its infancy, and we are all endeavoring to place it upon a proper basis, but the statements which are constantly appearing in the journals seem to me to be without foundation at present. We are just beginning to produce statistics which will be of value later. I do not think we can draw conclusions at present.

DR. JOHNSTON, Grand Rapids: Are all of the cases in the first column sent in from physicians with this diagnosis, or are they just general specimens?

DR. WARTHIN: The number in the first column are cases sent in for examination, the majority with the clinical diagnosis of suspected malignancy. The number of cases of carcinoma in the second column were shown by microscopical examination to be carcinoma.

DR. ————: Why should the clinical diagnosis always be regarded as incorrect?

DR. WARTHIN: The pathologist sometimes is up a stump, but certainly he has the advantage of the clinician. I do not want to discredit the diagnosis of the clinician, and I know that many clinical diagnoses are correct. The old idea that many forms of granulation tissue could not be distinguished from sarcoma is no longer true. Many of these forms *resemble sarcoma very closely*, but still it is possible to distinguish be*tween them. In carcinoma* the diagnosis is relatively easy.

DR. BAKER: Does Dr. Warthin base his opinion that the clinical diagnosis is wrong in many instances upon the last column? Are we to understand that from seventy to eighty per cent of the cases diagnosed clinically as carcinoma are wrong, and only twenty per cent are correct?

DR. WARTHIN: No; it would be impossible to reduce this to figures. It would be impossible for me to say how many of these were actually diagnosed as malignant. It means that the great majority of the cases were sent in with the suspected diagnosis of malignancy, and a certain number proved to be carcinoma.

DR. HUTCHINS: I should like to offer a word from the surgical clinic. In having these cases made out the clinical diagnosis was put beside the case named. In looking them over I was struck with the large number of epithelioma, especially about the mouth, and his first explanation, that many of these are being done outside of the hospital by many practitioners is probably true. Superficial epithelioma operations are comparatively slight, and I think that many of these are being done by the general practitioner who before would have sent them to the hospital.

MR. WELLS: This question is important, but from the standpoint of the health officer it is of still greater importance. Does Dr. Warthin regard cancer as a disease which can be restricted at the present time?

DR. WARTHIN: I suppose you refer to the parasitic theory. There is not at present the slightest proof that cancer is a parasitic disease. We are in the same position as formerly. Much of the work which tends to prove the existence of a cancer parasite is discredited.

DR. WILBUR: I do not suppose that the whole truth is found in this matter in the statistics or in the clinical observations. I believe from the general statistics that cancer is increasing. Those statistics showing the increase by age periods are also true for the entire registration area of the United States.

The hospital statistics, though very interesting, show the fallacies of small numbers. I should not regard them as of very much value one way or the other. They do not necessarily show the trend of the disease in Michigan. I have noted the bulletins from month to month, and compared them with the population, and have seen a step-ladder increase during the last three years. Under the old law the total mortality from cancer has always shown an increase over the preceding year. This is true in England, in Europe and in Australia, and from other places from which we have vital statistics. The increase by definite age periods is more satisfactory than any other. In New York, during the period of the establishment of the laboratories for the treatment of cancer, some very alarming statistics were used, showing that cancer had recently doubled, but these were subject to wide variations on account of the method of collecting them. Cancer has increased in recent years. What its sanitary significance may be is another question. This paper, I hope, may be of some use as illustrating our methods of work. If the parasitic theory can be proven these facts are of still greater interest. Cancer and certain other diseases are increasing. It is also a fact that as *you reduce* the mortality from scarlet fever, pneu-

monia, consumption, etc., in the early periods of life, more material is left for deaths from cancer.

The next subject on the program was "The Legal Duties of Health Officers," by Hon. Henry A. Haigh. Mr. Haigh said:

I should explain that the thoughts which I have very imperfectly prepared to present to you at this time are not properly covered by the title set down in the program. I think it was Dr. Baker's intention that I should prepare a statement of the statutory duties imposed upon health officers, but this matter has been gone over so many times that I think it may be as well to give a more general view of the functions of the health officer and his position in the social fabric.

THE FUNCTION OF THE HEALTH OFFICER.

BY HON. HENRY A. HAIGH, MEMBER STATE BOARD OF HEALTH, DETROIT.

It may not be generally recognized, but it is a fact, that the health officer is about the most important official in the community. There is no functionary who is charged with higher duties or graver responsibilities. Upon the efficient discharge of these duties may depend the health and consequent happiness and well-being of the human life within his jurisdiction.

Until the human race is much further advanced in hygiene and sanitation, its progress toward better living must depend largely on the conservation of those vital forces which go to make up health and vigor and normal length of life. And it is these priceless elements of welfare and happiness that are committed very largely to the keeping of the local health officer. This is true even though there is no Michigan statute directly specifying such duties, because the local board of health as such has inherent power to protect the lives and health of persons within its jurisdiction, and by statute the health officer is made the sanitary adviser and executive officer of the local board of health.

ENEMIES OF THE HUMAN RACE CLASSIFIED.

As a community of the human race emerges from the darkness of savagery, where the struggle was for mere existence, it requires, after food and raiment and shelter are secured, protection from its natural enemies. These enemies may be said to be of three general kinds, and the protection required may be considered under three separate heads.

1. Protection against men, members of other communities who seek for conquest or depredation.
2. Protection against themselves, under which may be considered internal civic regulations and restraints, and moral and spiritual administrations.
3. Protection against the forces of nature, the ravages of disease, and premature death.

The first protection required is furnished by the soldier. It is obvious *that the community must* be secured against pillage by marauding

tribes or conquest by neighboring communities, otherwise it cannot continue or make progress.

The second kind of protection is supplied by the civic administration, the lawgivers, legislators, moralists and spiritual admonishers.

And the third, the protection against disease and untimely death, by the physician, the sanitarian and the health officer. Of the three, however, the function of the health officer is incomparably the most important. The physician, under the old conception, rescues from disease; the sanitarian shows how to avoid, but the health officer wards off—prevents disease—and saves the individual and the community free to perform its several functions in health, strength and efficiency, free to enjoy its life in the vigor of unalloyed happiness.

In the order of time, the soldiers' service, perhaps, comes first. It is unquestionably indispensable, and it has been rewarded as no other service is paid for. The military hero is, I dare say quite justly, the greatest of all heroes.

But almost simultaneously must come the service of the second class, the orderly and just arrangement and enforcement of internal regulation, so that the community may not consume itself, its elements be kept from warring upon each other, and the strong be kept from preying upon the weak.

After these two great services are rendered, after the community is free from external attack, after it is secure against internal disorganization and disintegration, then it is found that the community must still be protected against the ravages of disease and against the causes of premature death, or it will fail in the competitive scheme, which seems to be the order of the universe. It will be supplanted by others better fitted to survive, and its life's history will end in failure and annihilation.

Here, then, is where the sanitarian and the sanitary executor or health officer finds his occupation, and finds, moreover, that his task is just as fundamentally essential to the well-being and even to the continuance of the community, as either of the other two classes of public servants.

For it will be observed that in the accomplishment of the first two public services, the protection against violence from without and disruption from within, so that aggregation, concentration and multiplication of individuals takes place, there has been brought about the conditions which render the third kind of protection equally essential and indispensable to the community.

Because the individual will sooner or later get sick, and the sickness, it is found, will be communicated to another, and from him to a third and so on, so that *"restriction"* becomes necessary, and this may involve *"isolation"* for a time; or the community may be subjected to a common enemy in the way of an "infected" atmosphere or contaminated water-supply, and *"disinfection"* or purification become essential in order that the community may be protected against the ills which the first two kinds of protection indirectly bring about, or in other words: That the community may enjoy the immunities and advantages thus secured, and so continue its existence and advancement.

Hence we see that the service of sanitation is as essential as any other, and that the health officer is or should be as much of a hero as the soldier or the statesman.

We have now, for the most part, got beyond danger from enemies which can be observed. Few communities are any longer in danger of annihila-

tion by enemies which can be seen and located. It is comparatively easy to fight Indians, elephants, wolves, mosquitoes and all visible organisms which can be attacked in the open. It is the micro-organisms, that infinite and innumerable host of inconceivably minute and microscopic enemies, that, while often easily destroyed when reached, are by reason of difficulty of detection, sublety of escape and marvelous power of multiplication, so disastrous in attack, that now demand most vigilant attention from sanitarians, and require of the health officer a generalship keener than that of Napoleon and farther reaching than that of Alexander.

In fact the service of the first order above named is no longer required continuously. Few communities are now in perpetual danger of foreign attack. As society and civilization advances, the community is left to itself to work out its salvation, and so long as it attends to its affairs in a proper and orderly manner, it is but rarely molested from without. We as a nation have never been attacked by a foreign foe and may never be. Still the soldier is not yet to be dispensed with nor to be less highly regarded as a useful functionary.

So, likewise, the service of the second order, the proper and just arrangement of our internal relationships and affairs, no longer requires consuming attention from every member of the community. The service has been reduced to a science. General principles of government, which required the united efforts of the race through many centuries to recognize and establish, are now conceded and acquiesced in for the most part willingly. These great principles, representing the brain and blood, the conscience, devotion, heart and will of heroic generations have come to us well-nigh perfect as our legacy from noble ancestors. The work of applying these principles in the elaboration of proper rules of conduct to fit the manifold relationships of human life has been far advanced.

Machinery for carrying these rules into effect and for applying them to the varied exigencies of modern experience, has been invented, wrought out by infinite pains, patience and fortitude, and made to work in a measure automatically.

I am not decrying the importance nor the difficulty of maintaining just and equitable social order and of conducting proper economic and municipal administration, but am only trying to show that a great deal of that great work has been accomplished, has come down to us as the priceless heritage of the past. Transcendently important as it is, and must continue to be, and well deserving the best thought of the best men, it still does not, nor should not, longer demand all the thought of all good people. And while I am not here to excuse the position taken by many intelligent men, of entirely eschewing all political activity, I do say that most of us are now free to devote some of our time and energy to other things.

Coming now to the third kind of protection which the community requires, that against untimely death, and considering the third order of public service under my classification, we find we are only on the threshold. We find ourselves confronted by practically a universe of unseen, intangible and unrecognized enemies, many of them capable of our annihilation, if once they get the upper hand, and concerning which we are not in full accord as to the proper means of defense.

The foregoing classification of the several kinds of protection required by the human community and of the classes of public functionaries engaged in the supply of same, may not be scientific, exhaustive or complete. It may be only fanciful. I make no claim of perfection for

it. Its purpose is only to afford a cursory view of the general conditions of human existence, to show the relative importance of the several sorts of service essential to continued human progress, and to inspire the workers in that great army whose terrible enemy is untimely death, with a sense of the sacred trust they have assumed and the immeasurable importance of their duties to their fellowmen.

Truly, my brothers, guardians of the public health, you are the vanguard of progress. You must clear the way. If you do not do so, we cannot turn to the soldier. His service is done, or practically so. We cannot turn to the statesman or civic administrator. His is another province. We have only you to look to. If you fail of your function, we are at a standstill and must soon retrograde. And the human race will have made a pitiable failure of its attempt at life on this planet called the earth.

When we reflect that man should live in health, strength, usefulness and happiness to seventy or eighty years, and yet dies miserably, the average man, at about fifty; when we reflect further that of all the babies born into this beautiful world nearly one-fourth die helplessly, and often really from neglect, before the age of five, and then when we try to realize what all this means in human suffering, sorrow, anguish and despair, or to be more practical, what it means in impaired usefulness and inability for further progress, what it means, to be coldly utilitarian, in actual aggregate cost, in the loss of the labor of those who needlessly die, in the loss of the priceless labor of bringing up, educating and fitting for usefulness the untimely dead, in the cost of the labor of those who attend the needlessly sick and dying, and in the consequent impairment of the vital force, power for resistance and power for achievement of those who remain, then we begin to grasp a faint idea of the inexpressibly solemn, sacred and momentous duties which we as sanitarians, as guardians of the public health, owe to the communities of which we are a part.

In view of the transcendent importance of this sphere of public service, the wonder is that in the evolution of the race it was not earlier exploited. We naturally ask why art, architecture and philosophy and other branches of human achievement, in no way connected with the military spirit, reached such high development centuries before sanitation as a science was conceived of. Those wonderful civilizations of antiquity, rivalling in many respects the highest human achievement of the present, because of their incompleteness of development and because, while the first two great orders or divisions of public protection which I have named were in normal and at times acute activity, the third and equally essential arm of protection was yet undeveloped, and those great races with their supurb achievements passed away from what we now consider preventable causes, from scourges which they were then powerless to prevent, but which it is now our province as sanitarians to restrict and in time to annihilate.

Perhaps one reason why sanitation and its allied agencies of protection were not developed contemporaneously with these earlier human capacities, was because under the law of evolution the highest development comes last. Scientists and students of sociology tell us that under this beneficent but inexorable law, both as applied to physical organisms and to social institutions, the highest and most important organ or agency is developed last.

In embryology the heart and lungs and other vital organs reach per-

fection before the brain begins to develop. In sociology the workers, the warriors, the water bearers, the food procurers and the builders of habitations, and after these the civic administrators are in an advanced state of activity before the sanitarian appears.

The latter seems to be the latest product of the law of evolution in human sociology, and hence the highest and for the time being the most essential agency for the protection of the race against its natural enemies. This agency, it seems, is being evolved because the earlier agencies, essential also in their several spheres, were ineffectual to preserve society from extermination.

I am not saying this in order to arrogate to ourselves as sanitarians a superiority over all other social utilities, but I do want to imbue every health officer and every soldier in the great army of sanitation with a just sense of the supreme importance of his calling, and an adequate devotion to the discharge of his sacred duties, and lastly with a belief in the great pervading truth that upon the intelligent and faithful discharge of those duties depends the further advancement, if not the present permanence, of the human race.

PREVENTIVE MEASURES.

Coming now to the practical consideration of *how* the health officer is to discharge these great duties (conceding their importance and avowing a willingness and anxiety to perform them efficiently), what are the things to be done?

Here we reach more familiar ground, and find that experience begins to hold her lamp to light our way, dimly, perhaps, in some directions, but still as a beacon for safe guidance and from which to take bearings on new and untried courses.

We find, for instance, that the great majority of causes of untimely and premature deaths, and a considerable part of costly, incapacitating sickness (which is perhaps worse than untimely death, for it makes the subject a drag and burden to the community) result from our neglect in permitting parasitic micro-organisms to enter the human system; or in other words consist of preventable disease.

This sort of preventable disease results from the introduction into the human organism of antagonistic or parasitic organisms which it is possible to keep out. But, in order to do this, we must *"locate"* the enemy. Whenever he appears within the borders of the community, notice must at once be given of his presence. For this purpose, the law makes every physician and householder a scout, and the health officer the Captain of the Scouts.

NOTIFICATION.

Notification of the presence in their midst of a subtle, deadly enemy, is absolutely essential to the community in order that it may protect itself from attack and prepare to repel the invasion or destroy the invader. Hence we set down *notification* as the first great sanitary duty resting upon every member of the community. One who knows or suspects the presence of a deadly foe, whose sole purpose is destruction, and does not tell his fellows, would seem to be almost in league with that foe, or to be a traitor to the community, and if his neighbors *attacked* and killed, their blood is on his hands. But wisely does *iw make it the specific* duty of certain members of the community

to be on the watch and to give this notice. Every householder, hotel and boarding-house keeper, or tenant is, as we know (Sec. 4452, C. L. 1897), required to immediately notify the health officer of every case of disease dangerous to the public health occurring in his premises. And if he does not give it, he may be fined $100 and costs, and on default sent to jail for three months. So, likewise, every physician must give similar notice of every case of such disease that he visits or that comes to him for examination, and if he does not give it, the law says he shall forfeit a sum not less than ten or more than fifty dollars. That physicians, who know more and better than householders or tenants of the deadly nature of these insidious and lurking enemies are let off easier than other people for failure to perform this greatest and plainest sanitary duty, is one of the anomalies of our statutes.

While the health officer is properly made the functionary to whom notice is to be given, he must himself take notice of dangerous communicable diseases. (Sec. 4460, C. L. 1897.) He will fall far short of faithful performance of his great duty if he waits for others to bring in the word that a demon of death is stalking through his territory. He himself should be in the watchtower and through the ranks and along the picket line. And when knowledge of the presence of the enemy reaches him, he must immediately investigate, and having given him the first needful attention, must then at once give public notice of his presence by placard or any other way if necessary, in order that the community may know of the threatened danger.

Notification then is the first sanitary duty enjoined by our statute law, and it is fortunate that the statute seems in perfect harmony with the requirements of sanitary science and the mandates of preventive medicine.

Every source of authority, therefore, seems to point to *notification* as the first duty of health officials, and having discharged that duty, we find it again fortunate that the statutes of this State lay next upon these guardians of the public health an equally essential duty which is equally in harmony with the obvious course pointed out by bacteriological pathology.

The parasitic micro-organism, in order to continue its career of devastation, must pass from the afflicted individual to the healthy one. To cure the afflicted patient is the province of the physician. To prevent the deadly germ from migrating to the healthy bodies of other members of the community is the imperative duty of the health officer.

ISOLATION.

As these parasitic pirates try to pass directly by contagion, or indirectly by infection, into the healthy human organism, it is obvious that the first and most effective means of restriction is by *isolation* of all infected persons and things. A barrier must be built around our bacterial foe; he must be imprisoned, and others whom he might attack must be kept away from him. The statute, therefore, most properly directs the health officer next to *isolate,* and in proper cases set up what is commonly called the local quarantine.

I will not go into the detail of this duty. Its performance is the most frequent and perhaps the most essential labor of the health official. But it is gratifying to observe that the deductions from scientific principles

and the mandates of statutory law are, so far as these duties are concerned, in harmonious and salutary accord.

Having now located, isolated and imprisoned our enemy. the next obvious and proper performance is to *destroy* him. This is the natural behest of preventive medicine. It is also the admonition and the mandate of the statute of this State.

DISINFECTION.

Destruction or *disinfection* is made, both by scientific and by statutory law, the third great duty of the health officer.

The details of this final function are perhaps the most familiar features of the health officer's activities. If faithfully performed, they fittingly and finally close his labors in the field of preventive medicine, so far as the micro-organisms are concerned, and leave him free for the performance of other correlated duties, such as the abatement of nuisances and the warding off of physical and mechanical dangers to which the community may be subjected.

I have sometimes wondered whether the associated labor of collecting and reporting the vital statistics of the community might not be wisely and advantageously laid upon the local health officer. Statistics relating to sickness, and to births, marriages and deaths, and especially carefully collected, correct and exhaustive information as to the causes of death are the basis of sanitary deduction.

The collection and return of these statistics is now (excepting some sickness statistics reported to the State Board of Health by health officers and voluntarily by certain local sanitarians) in the hands of civic officials, whose training and whose other official duties do not predispose them to proficiency in this work, and who, moreover, have but little natural conception of the importance of the information collected. The transferring of this branch of municipal machinery to the local health officers, with whose other duties it is so closely connected, would put its performance into more competent hands and would add a little to the meagre compensation of these indispensable public servants. For I do not hesitate to say that in proportion to the importance of their public service, the health officers are the most poorly paid of any public officials in the body politic. Their present compensation is grossly inadequate and ought to be increased, but it probably never will and never can be made commensurate with the inestimable value of their activities if exercised efficiently.

And no physician nor sanitarian should undertake these great duties with the idea of performing them in a manner proportioned to his pay. The health officer's function can not be commercialized, nor can he ever be paid in money what his work is really worth.

The greatest good to humanity is never paid for by money value. It is the altruistic effort that has in largest measure elevated man since the dawn of history.

The sanitarian should be paid and paid well by the community for his self-sacrificing labor, but his just reward can only come from a sense of duty faithfully discharged. The sanitarian should, therefore, be a man who can feel some reward from the search for truth and from devotion to the welfare of his fellows. He should above all be a humanitarian and a philanthropist, and be above all things imbued with the

value of human life. For it is the appreciation of the intrinsic value of human life, of man, the individual and average man—that marks the modern period, and insures progress.

It was very largely because of lack of this appreciation, lack of the value of human life and lack of knowledge of the *interdependence* of humanity, that the older civilizations were swept away. With them man, as such, had little value. Few ruled, the rest were driven; the toiler was not considered; the individual had no rights. The great mass was as dross. Man was only a clod. He was treated about as so much matter. Cleopatra could use her slaves on which to test the effects of deadly poisons and none protested. Tiberius could order an obnoxious subject to commit suicide, and he at once complied. Human life had no value; its possessor no rights. His body was built into the walls of cities, his blood marked the boundaries of empires, his labor wrought the luxuries of conquerors, but his life was not worth protecting. If he got sick, he was left to die. If plague and pestilence appeared, the masters left, the masses perished. And those unique and grotesque civilizations, so highly wrought in some inviting features, passed away.

We have learned some things since then. We have learned that the unit of human value is the human life. We have learned that the full value of this unit does not accrue unless that life is kept healthy and allowed to live its allotted time. We have learned that no life can be needlessly destroyed without injury to all the other lives of the community. We have grasped an idea of the interdependence of members of the community, and of the absolute rights of man.

The right to life, liberty and property is conceded. The right to health must follow. I do not know whether the time is coming when a man will have a claim against the community if he is not protected against preventable disease and premature death, but it looks that way.

Science has torn down the screens and snatched away the tiny shields back of which the secret, hidden, microscopic enemies of the human organism have found shelter. She has pointed out the means of detection, isolation, destruction and final extermination of many of the subtle, parasitic cutthroats that have waged perpetual and paralyzing warfare on the race of man. The spirit of humanitarian sociology has shown the true value of the human organism, that the living human tissue; which is the "spoil of battle" of these despoilers, must be regarded as sacred soil, and the invader kept aloof. That *man* is the priceless stake for which the war is waged, and that he must be protected no matter what his station, high or low, rich or poor. These enterprising little nihilists have taught us that in the death grapple with them men must be brothers; that the strong cannot be secure unless the weak are protected; that the rich cannot be safe unless the poor are also saved; that the enemy gaining lodgment in the hovel will move on to the house, and from the house he will migrate to the palace.

They have taught us, moreover, that it is war to the death; there will be little or no compromise. We may become immune to some of them, but in a larger sense, one side or the other must be exterminated.

Every member of the community is really a soldier in this mighty war. To win we must all co-operate. We should all be volunteers. Conscripts we may need at times, but they are not the best soldiers. Coercive measures may occasionally be required, but in the main intelli-

gent self-interest and education must be relied upon for that unanimous co-operation necessary for complete and final victory.

And in this last and greatest struggle of humanity, the health officer, acute, vigilant and unflagging, is the captain.

The "Warrior Bold" of olden times was a glorious hero in his day. But for the future we must look also to the health officer as our leader, protector and defender.

That he will prove true to his sacred trust I have no doubt, and I would speed the time when his leadership will be recognized, appreciated and justly rewarded, and when he will be hailed, like the statesman, as a benefactor, or like the warrior of old, as a hero of the race.

SHOULD VACCINATION BE COMPULSORY IN MICHIGAN?

BY GUY L. KIEFER, M. D., HEALTH OFFICER OF THE CITY OF DETROIT.

The question that I am about to bring before you for discussion has suggested itself to me on account of the unusual prevalence of smallpox in Michigan this winter. It is true the disease is prevalent all over the United States and it is epidemic in a great many cities, but as health officials of Michigan we have to do particularly with the public health work of this State and consequently a presentation of this subject at this time and place has seemed to me proper.

The weekly reports issued by the State Board of Health show that smallpox is on the increase in this State, certainly so far as the number of places from which the disease is reported is concerned. For example, on October 1, 1902, smallpox was present in 11 counties, at 16 places in Michigan; November 5 it was present in 16 counties, at 19 places; December 3, 1902, in 20 counties, at 29 places; December 31 in 40 counties, at 70 places; January 7, 1903, in 47 counties, at 101 places, and January 14, 1903, in 48 counties, at 127 places. In short, the record is rapidly approaching that of March 29, 1902, at which time smallpox was present at the greatest number of places during this present epidemic, viz., in 58 counties, at 165 places in Michigan.

Could and would this state of affairs be different if we had a law making vaccination compulsory in our State?

In taking up this discussion I will recite some experiences that I have had in the present outbreak of the disease in Detroit and on account of which experiences I have formed the opinions that I hold on this subject.

The outbreak at present raging in Detroit began on September 9, 1902. The first patient was a young man, twenty-four years of age, who claimed to have been vaccinated twenty years previous to his attack of smallpox. He contracted the disease somewhere in the State or on the train, inasmuch as he had been away, about the State, for three weeks prior to his illness. The next three cases in one family, none of whom had ever been vaccinated, were contracted in the country by exposure to "chicken-pox;" the following two cases, both of whom had never been vaccinated, *likewise contracted* by exposures to supposed "chicken-pox" and

the case of chicken-pox referred to was brought to us from elsewhere. This last exposure gave rise to a number of others before we had knowledge of the case in question. On October 28 there had been seventy-one cases in Detroit and there were on that date thirty-one cases under our care. I then made a report of the situation to the board of health and recommended that the board ask the common council for an appropriation of $50,000 for the purpose of undertaking a general vaccination in Detroit. I gave it as my opinion that by this means, together with our other preventive measures, the disease could be stamped out. The board of health adopted my report and acted upon it. They filed a petition with the common council asking for an appropriation for the purpose above mentioned. The matter was taken up by the committee on health and a general meeting of the physicians of Detroit was called to discuss the question. At this meeting, held October 29, 1902, and at which about 250 physicians were present, I was called upon to explain the smallpox situation and to tell why a general vaccination was necessary in Detroit at that time. After listening to my arguments, the assembly unanimously endorsed the petition of the board of health and gave it as their opinion that the action recommended was necessary at once. Then the matter came before the common council in the following shape: The committee on health offered a resolution that the board of health be allowed the sum of $20,000 for the purposes of a general vaccination. This resolution was bitterly opposed on the ground that the board of health and its health officer could not *enforce* vaccination, but was finally carried. At a subsequent meeting, however, the matter was reopened and the resolution again opposed on the ground that the health authorities had no right to *enforce* vaccination, and the appropriation was reduced to $10,000.

In the meantime the papers had taken up the subject and had come out in bold headlines, calling attention to the fact that there is no law compelling vaccination and that *therefore* it would be rank extravagance to allow any great amount of money for this purpose. It was argued that general vaccination must be accomplished by a campaign of education; that we must teach the people the necessity for such a step and show the good results to be obtained and they would then get vaccinated and thus protect themselves and their neighbors.

But will they? Let us see. The amount of money appropriated was not sufficient to undertake the plan of a general vaccination as originally outlined and therefore the plan had to be greatly modified. A general house-to-house vaccination was undertaken in that section of the city in which up to that time nearly all of the cases had been located; for the rest of the city we relied to a great extent on a campaign of education. Letters were issued to the members of the medical profession soliciting their aid, employers of labor were written to repeatedly and were urged to order their employees to be vaccinated, notices were printed in the daily papers calling upon all citizens to get vaccinated.

What was the result? In the district where our physicians went from house-to-house practically compelling vaccination by assuming the right to enforce it, about 12,000 persons submitted; some had been successfully vaccinated within five years and some few refused, basing their refusal in nearly every case on the statement that there is no law compelling vaccination. In the entire remaining portion of Detroit (and the section referred to embraces only about one-twentieth of the city) we

have succeeded in vaccinating up to date approximately 10,000 persons. Of this number nearly all submitted either because they knew that they had been directly exposed to the disease or because they were told by their employers that they must either be vaccinated or lose their employment, very few of the entire number were vaccinated because they "believed in" vaccination.

What will you say when I tell you that even today I had to argue for at least twenty minutes with a newspaper representative who had been directly exposed to a case of smallpox, before he would consent to let me vaccinate him. If men of intelligence cannot be educated up to our ideas on this subject what may we expect of the great mass of the people?

I told you that early in the present outbreak in Detroit nearly all of the cases were located in one section of the city. It was explained to the public that the possibility of infection was by no means limited to that section. They were told repeatedly that the only protection lay in vaccination; they were offered free vaccination daily at the office of the board of health. We have had now a total of 498 cases and instead of being located in the originally infected district, the great majority of the later cases are located outside of it. Of the last one hundred officially recorded cases, 81 were found outside and only 19 were located in the district above-mentioned; of the last twenty-five cases only one was located in that district. In other words, in that part of Detroit where vaccination was practically made compulsory, smallpox has ceased to exist except an occasional case in some one who absolutely refused even this method and these few cases would have been avoided had it been possible to actually and rigidly *enforce vaccination.* But in the remainder of the city, where on account of lack of funds we have had to depend entirely on a campaign of education, we are getting new cases daily. It is needless to say in this convention that nearly all of our cases are in persons who have never been vaccinated and for the most part in persons who do not "believe in" vaccination and who would never submit unless they were forced to do so. The efficacy of vaccination has been known for many years and every one who can be reached by a campaign of education has been vaccinated and revaccinated long before our present epidemic was upon us. In the argument for a campaign of education the employers of labor are invariably appealed to. How do they "educate" their employees to submit to vaccination? The only successful method is by telling them that they must either get vaccinated or leave their positions. That, it seems to me, is compulsion.

In the meeting of physicians above referred to, held for the purpose of discussing the smallpox situation in Detroit, one physician spoke against a house-to-house vaccination and argued in favor of a campaign of education. He called attention to the fact that one of our largest manufacturing firms in Detroit requires all of its employees to be vaccinated every five years. How do they require it? By a standing rule that no one shall be employed there who can not furnish proof of successful vaccination. Is that compulsion? The supreme court decided that it is in the case of school children and certainly it is in the case of working men and women.

If it were possible to educate all men and women to a level where they could distinguish for themselves between right and wrong, where they would know what to do and what not to do, then we could get

along without any laws, either for this purpose or any other. But until that time is reached we must have laws to instruct the ignorant and guide them in their actions. We know what can be accomplished by vaccination, we teach that knowledge to all who care to learn, but to those who will not listen we should be in a position to say "you must." Let us come out flat-footed in favor of compulsory vaccination. Let us challenge opposition and in this way find out who are the enemies to the progress of science, meet them squarely and show them by our facts and figures that vaccination is the only preventive of smallpox and that it should be enforced.

DISCUSSION.

DR. REYNOLDS, Chicago: I have been greatly interested in the presentation of this subject by Dr. Kiefer. The reason why people are not vaccinated, usually, is because they do not know about it. Possibly a statute in the State of Michigan would teach them. I am in favor of such a statute, compelling people to be vaccinated at a given age. I believe a parent has as much right to protect his children from death by smallpox as from cold or starvation, and this duty is equally incumbent upon the State. People, however, are not in favor of brute force without intelligence or reason. I believe there is no community in this country that cannot be reached and vaccinated if they are properly taught. We have in Chicago compulsory vaccination only so far as it applies to children in school. We manage, however, to vaccinate all who should be vaccinated in times of danger. We endeavor to get the individual who can reason with and convince such a person. We send twenty persons to such individuals if necessary. Force is repugnant to Americans. If they are not vaccinated we quarantine them, but if they are we turn them loose.

Many persons believe that vaccination does not always prevent smallpox. We have a term in our medical literature, varioloid, which means a disease modified by vaccination. I believe this should be wiped from the literature altogether. Proper vaccination will absolutely prevent smallpox and prohibit it. We believe that proper vaccination renders immunity more certain than does the actual disease itself, because in the history of the disease we know that smallpox can occur in the same individual more than once, even as often as six times in one record. The immunity of vaccination of course will die out, but one vaccination in the majority of persons, I believe, will last for a life time, and ninety per cent of persons who are vaccinated once in childhood and again in adult life will remain immune for the rest of their lives.

The smallpox records have not been correctly and properly kept. This is true in Chicago. In 1893 and 1894 we had so much smallpox that the physicians in attendance took the patient's word as to vaccination. Many persons mistake an attempt at vaccination for vaccination itself. Jenner himself taught that vaccination left a mark typical of itself, and which could be read on an arm for years afterward and which could not be mistaken for anything else. This is the only proper test for vaccination. If this is on the arm the person will not get smallpox except the scar be very old. It is a simple matter also to try the vaccination again. It is the duty of everyone to keep himself continuously saturated with cowpox lymph.

The general public is anxious to learn about these things, and the medical profession should be on the public platforms more often. Every doctor should post himself up and be able to do this. If the question of the prevention of disease were preached as Christianity is preached there would be fewer premature deaths; and again, if every pulpit was silenced, how long would it take to forget all about Christ and what He stands for? Not very long.

Whether we shall have compulsion by State enactment, I do not know. It certainly could do no harm. The State of Michigan has done nobly. You have health officers in practically every village and town in the country, and it is a noble work.

DR. ————: In what way shall compulsion be required? The only practical way is to require something similar to what Germany requires, that is, that every child shall be vaccinated at a certain age. I believe that we should go still further than this. We should compel them to require certificates of successful vaccination for admission to schools. I believe with Dr. Reynolds that vaccination is an absolute preventive for smallpox. Much of the opposition comes from ignorance, and we also meet with it in individuals who have been brought up in countries where compulsory vaccination is required. A large proportion of these have been taught vaccination from childhood, but when they get into this country they fall into the general opinion that it is of no use anyway.

DR. KIEFER: There are one or two points I would like to make: I knew when I wrote the paper that the words compulsion and compulsory were unfortunate ones. I realize the point that Dr. Reynolds brought out, that the American public does not want to be compelled to do anything. This brings out an answer to the question, How could we enforce such a law if we had it? If people refuse to be vaccinated we could not knock them down and vaccinate them anyway. We might quarantine them. However, we might not have to enforce the law. We could use it is an argument in our campaign of vaccination. Persons refuse usually because they say they do not have to be vaccinated. When they realize that it is required by law they will usually submit without any trouble.

Moved by Dr. Kiefer that the question of compulsory vaccination be referred to the committee on legislation. Carried.

On motion duly seconded it was agreed that the report of the committee on legislation be taken up as the first order of business in the afternoon session.

FOURTH SESSION, FRIDAY, JANUARY, 16, 2:00 P. M.

The committee on legislation made their report as follows:

Your committee on legislation respectfully reports as follows:

1. That county officials should not be required by law, as they now are, to order the payment of bills audited by the local officials.
2. That the health interests of the State should remain in the care of local boards of health.
3. That bills contracted for and audited by local boards of health should be paid by the localities in which the expenses are incurred.
4. That the questions of what shall be done relative to the restriction of diseases should remain, as now provided in Act 137, Laws of 1883, in the control of local boards of health.
5. That the questions of what are dangerous communicable diseases should be investigated by and published in every year by the State Board of Health; and the authority to call upon local health officials for such information as shall aid the State Board in determining the same should remain as at present.
6. That the State should establish and maintain a hospital for tuberculosis; and your committee recommend that the legislature be petitioned for the same.
7. That a general law regulating slaughter-houses, dairies and other places where food supplies are prepared should be enacted, empowering each city, township and village, through the local board of health, and through regulations properly published, to inspect and supervise the same, and prohibit the sale within their jurisdiction of the produce of the same, and the proximity, if necessary, of such slaughter-houses, dairies, and other places where food supplies are prepared.
8. That until better laws shall be enacted, every local board of health should make, publish and enforce regulations on these subjects, as authorized by Secs. 4412 and 4416 of the Compiled Laws of 1897, and assign places for the carrying on of slaughter-houses and other offensive trades.

HARVEY GILBERT,
T. M. KOON,
H. S. SMITH,
Committee.

Your committee would report upon the matter of compulsory vaccination referred to it, that this conference should recommend to the legislature the adoption of a law authorizing local boards of health, whenever in their discretion it is deemed necessary, to order vaccination or revaccination of all persons not immunes from smallpox.

HARVEY GILBERT,
T. M. KOON,
Committee.

The committee also desired to include the following in their report:

Resolved, That the Sixth Annual Conference of Health Officials in Michigan earnestly recommends that proper legislation be enacted to

insure the accurate and complete registration of births in this State, and that a committee be appointed by the president to coöperate with the State Medical Society, State Board of Health, and the State Department in urging the adoption of such measures.

The committee also reported that the following had been handed to them, but as it was not signed they did not include it in their report:

Resolved, That the State Board of Health should have authority to send the State Communicable Disease Inspector at State expense to investigate when they have reason to believe that there is an outbreak of any disease dangerous to the public health, even if the same has not been reported by the local health officer.

Upon motion made by Dr. Baker, and duly seconded, the last resolution was adopted by the conference.

Upon motion duly made and seconded it was agreed that the report of the committee should be read and acted upon by paragraphs.

The report of the committee upon the matter of compulsory vaccination was adopted as read.

The resolution in regard to the registration of births and the appointment of a committee by the Chairman was adopted in due form. The chair appointed as such committee Dr. C. H. McKain of Vicksburgh; Dr. Staley, of Charlotte; and Dr. W. Roos, of South Frankfort.

The main report of the committee was then acted upon by paragraphs as follows:

Section 1 of the report was not acted upon. Section 2 was adopted. Section 3 was ordered to be laid on the table. Sections 4 and 5 were laid upon the table. Section 6 of the report of the committee, relative to the establishment of a sanitarium for consumptives was adopted by the conference. Section 7, relative to the enactment of a general law for the regulation of slaughter-houses, etc., was adopted by the conference. Section 8 of the report was then adopted.

Summarizing the action, the resolutions adopted by the Conference were as follows:

RESOLUTIONS ADOPTED BY THE SIXTH GENERAL CONFERENCE OF HEALTH OFFICIALS IN MICHIGAN, ANN ARBOR, JANUARY 15 AND 16, 1903.

Resolved, That the health interests of the State should remain in the care of local boards of health.

Resolved, That the State should establish and maintain a hospital for tuberculosis; and that the legislature be petitioned for the same.

Resolved, That a general law regulating slaughter-houses, dairies, and other places where food supplies are prepared should be enacted, empowering each city, township, and village board of health, through regulations properly published, to inspect and supervise the same, and the premises and surroundings if necessary of such slaughter-houses, dairies, and other places where food supplies are prepared, and prohibit the sale within their jurisdiction of the products of the same when objectionable.

Resolved, That until better laws shall be enacted, every local board of health should make, publish, and enforce regulations on these subjects, as authorized by Secs. 4412 and 4416 of the Compiled Laws of 1897, and assign places for the carrying on of slaughter-houses and other offensive trades.

Resolved, That this Sixth General Conference of Health Officials in Michigan earnestly recommends that proper legislation be enacted to insure the accurate and complete registration of births in this State, and that a committee be appointed by the president to cooperate with the State Medical Society, State Board of Health and State Department in urging the adoption of such a measure.

Resolved, That this conference recommend to the legislature the adoption of a law authorizing local boards of health, whenever in their discretion it is deemed necessary, to order vaccination or revaccination of all persons not immune from smallpox.

Resolved, That the State Board of Health should have authority to send the State Communicable Disease Inspector at State Expense to investigate when they have reason to believe that there is an outbreak of any disease dangerous to the public health, even if the same has not been reported by the local health officer.

TUBERCULOSIS, HUMAN AND BOVINE, SANATORIA FOR CONSUMPTIVES. GENERAL DISCUSSION OF THE SUBJECT OF TUBERCULOSIS AND ITS RESTRICTION.

HON. FRANK WELLS, President of the State Board of Health. You all realize the importance of tuberculosis, and all agree that it is the most widespread and the most fatal disease that affects humanity. It is a peculiar disease in many ways. It is not only more extensive numerically, but also geographically, than any other disease. It ignores neither age nor sex. It is a communicable disease. The organism which produces the disease was discovered in 1882, by Koch, and is known as the tubercle baccillus. It is common to humanity and also to domestic animals. Birds and fish may be successfully inoculated with the disease. For this reason it is, perhaps, more capable of being spread than any other of the communicable diseases. It had been considered a communicable disease, even before the tubercle baccilus was discovered. The manner in which the disease is usually spread is by the sputum of human beings having the disease. It is also frequently spread by the flesh of animals having the disease and also by the milk of such animals. It is possible and probable that quite a large portion of the infant [illegible] so common and fatal are caused by the tubercle bacilli in cows' milk as it comes from cows having the disease. Infants should be taken only from animals known to be healthy and the milk should always be pasteurized to destroy the germs of any disease it may contain. The State Board of Health has endeavored to control the disease in the same way that it has the past contagious [illegible] diseases, that is by means of education. People are instructed in such a way as to have the disease in mind and how they may avoid contracting it. This instruction is intended to show that the bulk matter of the disease and the one most useful for us to consider is the sputum containing discharges from the lungs of the suffering from consumption. These matters are filled with myriads of the organisms of the disease. If these matter are destroyed

or disinfected at once, such organisms can do no harm. But if even small portions of them find lodgment in rooms they may remain there indefinitely, and finally, after drying, the organisms they contain may be taken up by currents of air and inhaled by human beings, who, if susceptible, may take the disease. These facts you will all agree are true. The question of how people can be made to understand these facts is a most important one. The State Board of Health has endeavored to instruct them by means of leaflets sent to families where the disease exists, and to their neighbors; by means of sanitary conventions, by means of literature supplied to the public schools, and by means of conferences like this. By these means the State Board of Health has sought to secure the active coöperation of all classes in the campaign which it is waging against this disease. Unfortunately it is among the least intelligent, where this education comes last, that the disease is most apt to exist. A large proportion of the poor of our cities and larger towns live in tenement houses occupying, perhaps, but one or two rooms. Families in such tenements are often large, and one person in a family having the disease is capable of infecting not only members of his own family, but also others living in the same building. The knowledge which reaches such people filters down to them very slowly. Many of them are laboring men, or operatives in factories, and of these many are engaged in pursuits where they may contaminate with the disease the articles which they manufacture. The most serious menace, however, is in their homes, where their sputa finds lodgment upon furniture, carpets, and other articles, causing these homes to become centers of infection, not alone to the families who occupy these rooms but to any who may enter them. To provide for this class, which has neither the knowledge nor the ability to provide for its consumptive sick nor to prevent them from spreading the disease to others, the State Board of Health has, during several sessions of the legislature, urged that body to appropriate money for the purpose of building, furnishing, and conducting a sanatorium for consumptives. We have thus far not met with sufficient success in convincing members of the legislature of the importance of this work to induce them to pass an act for this purpose. To my own mind the present session of the legislature opens a more favorable opportunity for this than ever before, because the facts which I have stated concerning consumption have become more generally disseminated among the people than ever before. Consumption is coming to be recognized more and more as a contagious disease, and there is a more general recognition of how it is communicated, and a more general belief that homes where the disease has existed are quite liable to become contaminated by the disease.

In New York City the Board of Health has maps showing the houses in which cases of tuberculosis have occurred. In many of the older houses one finds two, three or four marks, indicating that number of cases of tuberculosis following each other and showing that such houses have become capable of infecting new inmates during comparatively long periods of time.

But there is little use of my presenting to this body instances of this kind. You are quite familiar with them and I believe you all favor a sanatorium. But it is one thing to favor an institution of this kind, and another to engage in active work to secure it. I should like to impress

upon your minds the importance of such work and I trust that each member of this conference will return to his home with a firm resolve that he will do everything in his power not only to establish public opinion in his jurisdiction in favor of this, but will make it a point to see his senator or his representative and endeavor to impress upon him the importance of voting in favor of the bill which will be presented in the legislature now in session providing for building and conducting a sanatorium for consumptives somewhere in this State.

In our campaign of education we have found it quite difficult to get consumption reported by physicians to local health officers. You have the power, gentlemen, to aid this work greatly. You can insist that cases which you know to be tuberculosis be reported to you. You ought by this time to realize the importance of this for the purpose of restricting the disease which is causing more deaths than any other. As health officials your part and your share in reducing the mortality from a disease which causes nearly twenty-five hundred deaths in Michigan every year should be of great value.

DR. KOON, Grand Rapids: If we are going to get the various measures before the legislature which have been adopted it will take a lot of work and wire pulling at Lansing. It seems to me to be proper that we should have authority from this conference to take charge of this matter and to coöperate with the State Board of Health; and therefore I make a motion that a committee of five be appointed by the chair to look after matters of health legislation at Lansing; and as Dr. Kiefer of Detroit is the father of one of these measures I would suggest that he be made chairman of the committee. Motion was supported and voted upon in due form by the conference and carried.

DR. VAUGHAN: Inasmuch as I am to talk on the pollution of streams in a few moments, I will only say that for the last four or five sessions of the legislature we have gone before that honorable body and requested a small appropriation for the establishment of an institution for consumptives. I had hoped that Michigan would be the first of the states to do this, but this is now impossible, as Massachusetts has such a sanatorium in active operation. New York has made preparation for several sanatoria. Pennsylvania has done something in this direction. Bills will be before the legislatures of several other states this year to make similar appropriations. The necessity of such legislation is self evident, and Michigan will soon fall into line. In Germany there are forty or fifty of these institutions already. In Germany the provision is largely due to the fact that every employee has to have his life insured, and the government has to pay in part this insurance. Really the government insures the man's life through certain companies. These companies have found that it is better to take a man with initial tuberculosis and cure him than to let him die and pay his life insurance.

The attitude of the medical profession towards tuberculosis is wrong. We have been taught to believe that tuberculosis is an incurable disease, and most physicians shut their eyes to the existence of tuberculosis until it is too late. There is no other grave disease so easily curable as tuberculosis. The fact that tubercular lesions may perfectly heal and leave no scar has been abundantly demonstrated both by laboratory experi-

ments upon animals and by observations upon human beings. Some five or six persons have had their abdomens opened for the treatment of peritoneal tuberculosis, who later had to have them opened on account of some accident or some other trouble, and no trace whatever has been found of the disease for which the first operation was made some years before. If taken in time, there is no grave infectious disease so easily curable as tuberculosis. We all know this if we stop to think about it. If we put the patient under good hygienic conditions, give him plenty to eat and drink, and plenty of fresh air, he will get well without medicine. There are thousands of poor people in this State who cannot take care of themselves. I saw a few days ago a woman in the initial stage of tuberculosis. She said she was the mother of five children, whom she supported by her labors at the wash tub. Such cases as this should be taken care of by the State. It would be a good thing for the individual and a good thing for the community. This woman that I mentioned will no doubt die of the disease, and her children will also become infected.

This is a glorious work in which we are interested, that of abolishing tuberculosis, and we are going to accomplish it. There is no question about it.

DR. BAKER: No health officer is required to wait for the report of the attending physician in such cases, but if he believes that there is a dangerous communicable disease in his vicinity, he is to make the necessary examination and report. This certainly would also include a caution to the patient as to how he can best work for the restriction of the disease. The great reduction in the mortality from consumption in this State has resulted from the education of consumptives themselves.

SEWERAGE INTO THE WATERCOURSES OF MICHIGAN. WHAT SHOULD BE DONE ABOUT IT?

ADDRESS BY VICTOR C. VAUGHAN, M. D., PH. D., ANN ARBOR.

This subject is a very important one, and there will not be time for me to discuss it as it should be discussed. I should like to do so, but there will not be time, and I will have to make my statements very concise, and probably will not have time to explain all of them. It is easy enough to say that a law should be passed forbidding the pollution of streams. This, theoretically, may be all right, but there are practical difficulties in the way of carrying out such a law. It is impossible in the present state of science to dispose of the sewage of certain cities without carrying it into watercourses, and it would be the height of absurdity, even had the general government the power, for a law to be passed forbidding absolutely the pollution of streams with sewage. The state legislature of Massachusetts has enacted and had on its statute books for a number of years a law forbidding the pouring of sewage into any stream of the state within twenty miles of the intake of a public water supply, but many of the streams in Massachusetts flow into that state from adjoining states,

and they have not the power of controlling the sewage from the cities of adjoining states.

I hold that this is a question which must be settled by a study of each individual case. It is absolutely impossible at present to dispose of the sewage of certain cities without carrying it into streams. Again there are great industries that must be taken into consideration. We cannot blot out of existence all of the pulp mills. We cannot by one enactment of a law at Lansing make the conditions such that the sugar beet factories in this State could not run. Many of them could not do so if it was illegal for them to throw their refuse into running streams. It is a matter which must be studied for each locality.

The great city of New York is very well situated with reference to its water supply. It gets its supply from the Croton river, which is a small and short stream, and the tributaries of which can be controlled, and the legislature has very wisely given to the city of New York practically absolute authority to inspect the watershed of the Croton and its tributaries, and the city has the authority to condemn, and it has condemned and destroyed every source of contamination. But, take the water supply of such a city as Louisville, Kentucky. Shall the general government be asked to protect the streams of the United States from pollution? This would mean practically the aboltion of every manufacturing establishment on the Ohio above Louisville and its tributaries. What would Cincinnati, Wheeling, Pittsburg, and hundreds of other cities along this river do in the way of disposing of their sewage?

The science of the purification of water has been investigated very thoroughly, and I think that it is safe to say that there is at present no river, certainly no river of any size, which receives the sewage of any city or number of cities, which is so impure that by scientific means the water cannot be rendered a perfectly safe drinking water. I have said with reference to the water supply of Louisville: The people of Louisville must take their water from the Ohio river. They must take it from the Ohio river knowing that it is polluted, and then they must purify it. This is what they are attempting to do now.

The city of Berlin takes its water from a river not much larger than the Huron and purifies it. London is supplied by a number of companies, one of which takes its water from the Thames, and this water is so far purified that there is but little more typhoid fever, if any more, in the section of the city supplied by this company than in those supplied by companies which bring their water from the chalk hills of Dover.

Shall this stream be polluted or not, is a local question, which must be studied individually. I am inclined to think that the rivers of the world are to be used largely in the future as sources of power. Time will show whether this is correct or not. I asked an engineer a short time ago to give me some idea about the amount of energy that is going to waste in the little river that flows through this town. He said that a very liberal esimate would permit his saying that there is enough energy going to waste in the Huron river to light every city, village and farmhouse for two miles on each side of its banks, from Strawberry lake to Lake Erie, and this power is furnished by a fuel not under the control of any trust. The heat of the sun evaporates the waters of the Great Lakes, and the clouds come over Michigan and fall to the earth and return to our rivers and lakes. The trusts are not likely to control this right away.

The city of Ypsilanti, I believe, is now lighted from power furnished by the Huron river. Ann Arbor is 881 and a fraction feet above the ocean. We are 381 feet, or thereabouts, above Lake Erie. All of the water in the Huron river falls a distance of 300 feet in thirty miles. In many places, by cutting a channel across from one to two miles, the length of the river would be cut down ten miles, and a fall of ten to twenty feet obtained. Think of the power which goes to waste in the Mississippi from Lake Itasca to the Gulf of Mexico! An engineer has told me that there was enough power going to waste in the Mississippi river to pull a continuous train of cars along its banks from New Orleans to Minneapolis. All of these things must be taken into consideration. For instance, up at Alma they have a sugar beet factory. They pour their refuse into the Pine river, and the people of St. Louis are drinking that refuse. I have examined the water a number of times. I have found not only evidence of beet pulp in the water, but I have even found sugar in it. This river is a very tortuous one. It flows many miles in going from Alma to St. Louis.

There ought to be in this and every state some board of control which should have authority to study the water supply and the question of the pollution of streams in individual cases. I simply wish to conclude by saying that I do not believe that any absolute rules can be laid down with reference to this matter. It has been shown that typhoid fever germs poured into the Hudson river at Troy and Albany may be detected at New York City. You can thus get some idea of the long distance that these micro-organisms may go and still be present in all their virulence.

A number of years ago the question of the self purification of streams was very earnestly discussed by two of the best men in the world on this subject. Professor Pettenkofer of Munich held that a river purified itself after receiving the sewage of a large city after it had flowed twenty or thirty miles. Professor Frankland of London, concluded that there is no river in England, Scotland or Wales long enough to purify itself after receiving the sewage of any large city. If any one will go to Munich and examine the rapidly flowing Iser, they will see why Pettenkofer came to his conclusion, but if they will look at the Thames, they will see why Frankland came to his. They were like the storied men of old looking at the opposite sides of the shield. The character of the bottom, the number of rapids, the kind of fish, all of these must be taken into consideration in deciding how rapidly a given river will purify itself. Every case should be studied upon its own merits. I have been most seriously condemned for not joining in requesting the State or the United States to pass a law protecting the streams of the country from pollution. I do not think, however, that any absolute rules can be laid down on this subject.

I want to give way to a man who has had experience with the most stupendous attempt that has ever been made to dispose of sewage, and that is Dr. Reynolds of Chicago. I want to hear about the drainage canal, and I want his opinion as to whether it would be possible to dispose of the sewage of Chicago without turning it into a watercourse; and also whether the drainage canal has materially cut down the number of cases of typhoid fever.

DR. REYNOLDS: With reference to Dr. Vaughan's discussion, I want to give it my unqualified approval. It certainly is a local question. The conditions which prevail in any one community are not those which prevail

in another. Perhaps more of the streams can be purified as he suggested. Tile drainage of farms is also of importance in polluting streams. Cities lying upon streams can take the water from higher up. A city situated upon a lake cannot do this so completely or so well. I believe that the streams are the natural drains of the country, and must contain from the swamps, marshes, and farmyards a great deal of impurity, even if human sewage is kept out of it.

With reference to Chicago: Our sewage was poured down the Illinois river in a raw state for a great many years. Now a great deal more is going down, but with it there is a large quantity of fresh water. The fish have very much increased in the Illinois river since our drainage canal has been put through. Our system is not as yet in active operation. Only a small quantity of the sewage of Chicago goes into the canal. The great disturbances of the lake has lately made the water much more impure than it otherwise would be. The river itself, which formerly was unspeakable in its condition, has been greatly cleared up.

Our intestinal diseases have been very greatly reduced. This year we have had a recrudescence of typhoid due to some specific infection of our water supply, but it was not infected with the cause of the more acute infectious diseases. Our expenditure has already paid us in dollars and cents. If the mortality rate from typhoid that we had in 1891 had continued to the present time there would have been some fifty or sixty thousand less people in Chicago than at the present time. I believe that we have not had the last word upon this question yet.

GRANT M. MORSE, State Game and Fish Warden: I have had considerable to do with this question of sewage and refuse from various factories. We have alcohol and chemical plants. All of these industries are practically new in Michigan, especially in the size of the plants being operated. The sugar beet industries produce a great amount of pulp, and the pulp, and the water, and the soil, and compost from the farms, and all of the chemicals, lime, sulphuric acid, etc., must necessarily find its way back to the common drainage, and from there into our Great Lakes. Most of these streams have been well filled with fish, but when the factories commenced to pour their pulp into them there were complaints that the fish were being killed. This complaint only came during the winter season. It was not very extensive except in the Saginaw river. A year ago last April there was complaint that wagon loads of fish were being killed in the stream at Vassar. I made a personal investigation and found that this was actually true. The question was as to the cause of the death of the fish. I found that the fish remaining in the stream had all headed to the little creeks and rivulets coming in from the sides. I even found fish coming to the top of the water in large numbers which led me to believe that there was a dearth of oxygen in the water. At last I saw an eel making this same move for air. I went to Caro and made an investigation and found that where a year ago they had had a natural settling basin they had allowed this to fill and raised the dam. Their pulp basin, which was across the river from the factory, was running a large stream into the river. Samples of the water were analyzed by Dr. Kedzie. It was found that the amount of organic matter being thrown into the stream from that factory was actually using all of the oxygen dissolved in the water. I immediately took steps to have the matter repaired, and I will say that the factories in every instance have met me more than half way in their efforts to care for the sewage.

It is a great question, and we have not heard the last of it. It is a local question to a great extent. I believe that the question is one that should be cared for at once. I do not find any bad results from it except to the fish. Eventually this pollution will affect the health of the State of Michigan, however. Let us take this matter up along the line of the locality, and let each locality take hold of this matter fearlessly and candidly, and there will be no difficulty with the manufacturers. The factories can care for these questions if they are made to, but will not do it unless they are.

HON. HENRY A. HAIGH, Detroit: With respect to the present legal status of this question, there is no State law affecting it. The State has not seen fit to exercise its undoubted power to regulate this matter. All that can be done as the law now is, is by means of the power delegated to the local authorities. Something might be done in the way of suppressing nuisances. Perhaps the supervisor might start the prosecuting attorney. It has been suggested that the time has come in Michigan for the State to do something in this line. In Ohio the matter is placed under the control of the State Board of Health.

DR. VAUGHAN: At the instance largely of the State Engineering Society there will be a bill presented to the legislature at the present session giving to the State Board of Health the power to employ an engineer to study the conditions existing in any one locality. The bill will provide that no one shall pollute a stream or take a public water supply from a stream without the approval of the State Board of Health. The State Board is not anxious, but is very reluctant, to assume this responsibility. The bill, however, will undoubtedly be introduced. It has seemed to me and to others that this is the wisest measure that could be adopted.

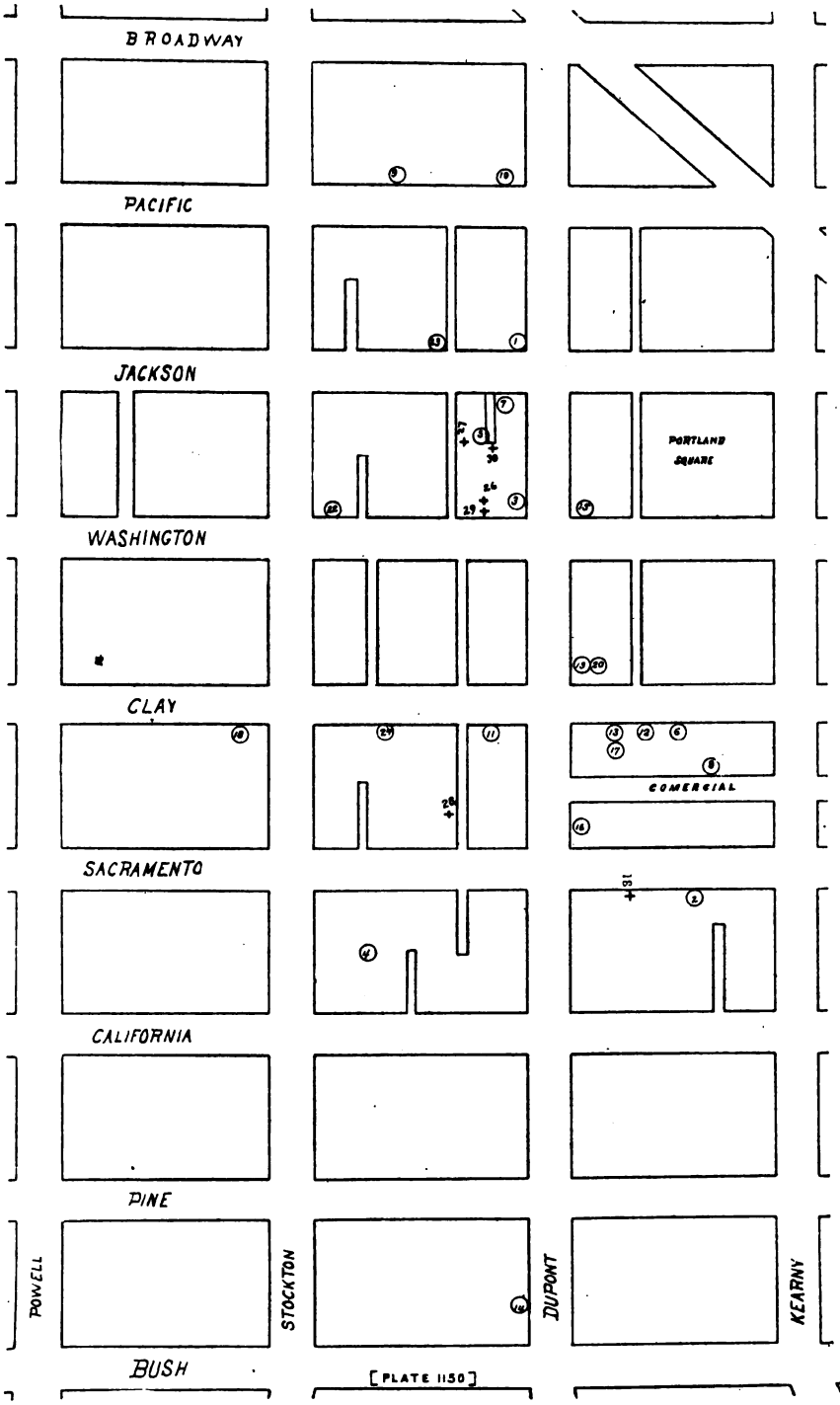
The chair appointed the following as the committee for the promotion of legislation recommended by the conference: Dr. Guy L. Kiefer, Detroit; Dr. Thomas Koon, Grand Rapids; Rev. Caroline Bartlett Crane, Kalamazoo; Dr. Gilbert, Bay City; and Dr. King of Manistee.

THE PLAGUE IN CALIFORNIA, AND WHAT TO DO IF THAT DISEASE SHOULD BE BROUGHT INTO MICHIGAN.

ADDRESS BY F. G. NOVY, M. D., PROFESSOR OF BACTERIOLOGY, UNIVERSITY OF MICHIGAN, ANN ARBOR.

It is only nine years since the plague announced itself to the world at large by starting out from southeastern China. In a very short time it passed to India, then to Africa, and eventually appeared, though to a slight extent, in several of the European cities, notably Oporto, Odessa, Glasgow and Liverpool. On the other hand, it traveled eastward, and appeared in the Phillippine Islands, in Japan, in the Sandwich Islands, and in San Francisco, where its existence has been persistently denied by the State authorities. In Mazatlan, Mexico, plague has been recognized since December 13 of last year and is believed to have been introduced *from San Francisco.*

MAP OF "CHINATOWN," SAN FRANCISCO.



The diagram [Plate 1150] shows that portion of the city of San Francisco, known as Chinatown. The figures indicate the location of the first thirty-two cases known to have occurred in that city. This represents the number of recognized cases at the time of the conclusion of the work of the United States Commission. Since then additional cases of plague have been reported and verified, making all told ninety-three cases which have been recognized during the past three years. The distribution of these cases will be seen from the following table:

SUMMARY BY MONTHS OF RECOGNIZED CASES OF PLAGUE IN SAN FRANCISCO.

	1900.	1901.	1902.	Total by months for three years.
January	.....	3	.....	3
February	.....	6	1	7
March	4	1	.....	5
April	1	2	1	4
May	5	.....	3	8
June	2	.....	.....	2
July	1	5 (1)	5	11
August	2	1	10	13
September	.....	6 (2)	10	16
October	4	3	8	15
November	2	1	3	6
December	1	1 (1)	1	3
Total	22	29 (4)	42	93

Grand total up to 1903, 93 cases with 4 recoveries—83 Chinese, 4 Japanese and 6 whites.

I may say first that the disease made its appearance in San Francisco, so far as recognition is concerned, in March, 1900. On March 6, 1900, the first case was recognized. The disease undoubtedly had existed in San Francisco for some time previous to this date, but it was not recognized before. The outbreak of plague in Honolulu, beginning December 12, 1899, led the city Board of Health of San Francisco to expect the disease and eventually resulted in its detection. While the commission was at work in San Francisco evidence was brought out which lent color to the belief that the disease had been there for two years before, but absolute proof of this is wanting.

An examination of the table will show considerable irregularity in the occurrence of the disease. Some months show no recognized case while others show as many as sixteen cases. The largest lapse of time between cases is ninety-two days, the next largest is seventy-two days; and there were three lapses of fifty days. There has been no case since December 11, 1902 (to March).* It will be seen that in 1900 there were twenty-two cases. In 1901 the number of cases recognized was twenty-nine and in 1902 the number rose to forty-two. It is evident from these figures that the plague has not disappeared from San Francisco. On the contrary,

* *Only one case, that of March 17th,* has been reported up to the middle of June of this year.

the figures show that the disease is slowly gathering headway. And yet, in face of these facts, the new mayor of the city of San Francisco has seen fit to remove from the city Board of Health those members who courageously stood for truth regardless of the abuse heaped upon them by the local press.

This closes the first chapter of the history of the plague in this country.* From now on we will not be able to find out much about the status of the plague in that city. What will be the future chapter? I do not want to pose as an alarmist, but there are certain things that must be considered. Plague is abroad in the world, and the rapid means of communication which exist are bringing it to nearly every port in the world. Every little while we hear of cases brought to New York harbor. Fortunately the long sea voyage usually leads to the detection of such cases before they land. Mexico, at the present time, has an outbreak of plague on the western coast. The fact that we have, within the actual border of the United States, a plague center, is of the greatest importance.

When the plague appeared in San Francisco the papers of the country at large, and of that city as well, were greatly alarmed. The old histories of the pest were resurrected. The annals of the great Black Plague and of the London Plague were recounted in all their horrors. It was very soon found, however, as these figures indicate, that the disease was not spreading like wildfire. On the contrary, there were scattered local cases, confined to Chinatown.

The original feeling of alarm soon gave way to an entirely different feeling, actuated, no doubt, by financial and political motives, with the result that the state authorities strenuously denied the existence of plague in the city of San Francisco on the ground that the disease did not cause a widespread epidemic.

We may ask ourselves, Why has not the plague developed more rapidly in that city than it has? To answer that question satisfactorily is quite impossible. There are plenty of localities in India itself where plague does not spread when once introduced. Again, and again, plague has been brought to certain towns in India, the cases brought there died, but no new ones originated. There are localities favorable, and localities unfavorable. One of the most important factors in the development of the disease, unquestionably, is the personal habit of the people. We can readily assume that in San Francisco the conditions existing in this regard are much better than those in India or in China.

Again, another feature which has, perhaps, even more to do with the lack of the spread of the disease is the absence or scarcity of infected rats. We endeavored to secure rats in different places in Chinatown, but we were not very successful. A small number of live rats were caught in traps and a few dead rats were found on the streets, but none of these on examination showed the presence of plague bacilli. Prior to November 8, 1902, the plague laboratory in San Francisco examined some fifty or sixty rats at irregular intervals with likewise negative results. On that date systematic efforts were made to trap rats with the result that fifteen infected rats were found up to December 8, but none since then to

* Since the above was written a change for the better has taken place. On January 19, 1903, a conference was held in Washington between a number of State Boards of Health and the United States Marine Hospital with reference to the plague situation in San Francisco. The result was that the new mayor and the State authorities were forced to recede from their position, as shown in their statement of February 2d. Complete and harmonious action on the part of the city, State and Federal officers, is assured for at least one year.

June, 1903. It is significant that twelve out of the fifteen infected rats were found in one house, or within a radius of a few feet from it. For some reason the rats are not widely infected and this fact undoubtedly has a great deal to do with the localized, sporadic character of the disease in that city.

It cannot be denied that plague is spreading insidiously throughout the world. New foci are being constantly infected. I believe that isolated cases of plague are going to come, and for that reason it is desirable for the health officers and for the people at large to understand what the plague is and how it can be prevented.

There are two types of this disease. One type is due to inoculation through wounds, and insects, such as the flea, are believed to be instrumental in this regard. This type is relatively non-contagious. It is not easily transmitted from one individual to another and there is no particular danger from such cases. The risk is great, to the individual, if the disease once gets hold, but it is no more catching than many of our common infectious diseases. This type is commonly known as the bubonic, owing to more or less pronounced swelling of the glands, particularly those in the inguinal region.

There is a second type of the disease, the pneumonic type, in which the bacillus is localized in the lungs. This is as dangerous as ordinary pneumonia, perhaps more so. While there are quite a few that recover from the inoculation type of plague, perhaps one-tenth or more in the case of the pneumonic type, it is the exception for an individual to survive. In the latter case plague bacilli are present in the saliva and sputum, and the danger, therefore, is one of inhalation, which, obviously, it is difficult to ward off.

The first thing necessary to control the disease is to recognize, if possible, the first case. This may be possible, and it may not. If the first case is recognized, whether pneumonic or bubonic, it can be controlled, and no further trouble need be expected. A year ago we were unfortunate in having an accidental infection here, and we had a typical pneumonic case. It was recognized at the outstart, however, and the necessary measures to prevent its spread were taken with perfect success. This case was nursed by two medical students who freely volunteered to take care of a friend in distress.

The recognition of the disease has to be made by bacterial tests. This is the only way that an isolated case can be correctly diagnosed. Cultures can be made from the blood of a suspected individual, if the disease is of the bubonic form. Cultures can be made also from the glands and from the sputum. By the ordinary microscopical examination it is possible to tell quite definitely whether or not plague is present. For a crucial test animal inoculation is resorted to.

If, on the other hand, the disease is not recognized until a number of cases appear, the problem is quite different. Every case has then to be taken and treated as a source of infection.

When the disease is recognized the first thing to do is to isolate the sick. Absolute isolation is necessary; this is a self-evident proposition. They can be better taken care of in a separate house or hospital where they can be treated by competent persons. We know that the organisms of plague may leave the body in the fæces, urine, blood, pus, and sputum. Consequently these and everything that leaves the sick individual (eating

utensils, wearing apparel, bedding and the like) should be sterilized; not merely disinfected, but sterilized. There is nothing better for this purpose than plain boiling water.

In connection with the sick person it may be said that it is necessary and desirable to proceed at once to the treatment. The sooner this is done the better will be the result. There is only one treatment, and that consists in the use of the antitoxin for plague. This must be used boldly and in large quantities by subcutaneous and extravenous injections. I would like to urge right here that it would not be a bad policy for every health board, particularly in large communities, to have on hand a supply of antitoxin, enough to meet emergencies for a few days. If a supply is not on hand it means sending to a distant place for it, perhaps to Paris. It would not be a bad expenditure for these larger boards to have at their disposal, at all times, a supply of fresh material, say 100 bottles of antitoxin. This serum will deteriorate in time, and for that reason the supply should be renewed once or twice a year. The one reason why we were fortunate in saving the life of our young man who had the pneumonic type is due to the fact that we happened to have on hand a fresh supply of the antitoxin, and we used it at once in large quantities.

I will now pass on to the question of vaccination and segregation of those who have been exposed. We have at our disposal a method of vaccination which is just as efficacious as that for smallpox. We know that we can, for a surety, vaccinate a person by means of the anti-plague serum, or by using the Haffkin vaccine. The Haffkin method is more dangerous because it produces a well marked fever, and indisposes the individual for several days, but when he recovers he has an immunity which will last for months. If the anti-plague serum is used as a vaccine it is necessary to revaccinate the person every week or ten days, because the immunity which it causes is only temporary. Haffkin's vaccination is more lasting, but it should not be used when the person has been recently exposed.

Isolation, disinfection and vaccination are the first things to consider in order to prevent, restrict and eradicate the disease. But when this is done the root of the evil is still untouched. How does man get the disease? In the case of the pneumonic form, by inhalation. In the case of the bubonic type, which is an inoculation disease, we believe that usually the wound is caused by insects. In times of plague rats are infected with the disease, and on some occasions rat epidemics precede the epidemic in man. But how does the disease, perhaps naturally one of the rat, get into man? The usually accepted view is that the flea is the transmitting agent. This method of transmission is well recognized in a variety of diseases. A cattle disease known as surra is carried from one animal to another by an insect just as Texas fever is. Malaria is another illustration. In the plague we have the flea as the possible agent which transmits the disease from an animal to man. This view, however, cannot be said to be absolutely proven.

The rat flea is usually charged as being responsible. We may well question, however, whether this is true in all cases and in all localities. We must not forget that fleas from other animals may at times bite the human species. It is sometimes denied that the flea of a dog will bite a man, but it is true nevertheless. The same is true with the flea of a chicken. In view of the part played by the rat in the spread of plague it is evident

that isolation, disinfection and vaccination are not sufficient to eradicate the disease when it has once established itself. The destruction of rats is an essential measure and without this no real success can be attained.

In response to a question in regard to the clinical symptoms of the plague, Dr. Novy said:

At the outstart there is a marked fever of 103 to 104°, and the pulse runs up to about 140. The patient has a very anxious expression which, once seen, cannot be forgotten. These are the striking points; with these may be coupled enlarged glands in some part of the body.

On motion duly made and supported the State Board of Health was tendered a vote of thanks for the program which they had furnished for the conference.

On motion, the conference adjourned.